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PLAN AND ENVIRONMENTAL IMPACT STATEMENT FOR WATERSHED PROTECTION AND FLOOD PREVENTION ROBINSON CREEK WATERSHED

Lincoln County, Oklahoma



PREPARED UNDER THE AUTHORITY OF THE WATERSHED PROTECTION
AND FLOOD PREVENTION ACT
(PUBLIC LAW 566, 83rd CONGRESS, 68 STAT, 666), AS AMENDED

Lincoln County Conservation District
City of Prague
Lincoln County Commission

FEBRUARY 1978

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

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PLAN AND ENVIRONMENTAL IMPACT STATEMENT

FOR

ROBINSON CREEK WATERSHED
OKLAHOMA

FEBRUARY 1978

ADDENDUM

Robinson Creek Watershed, Oklahoma

This addendum shows the project costs, benefits, and benefit-cost ratio based on $6\frac{5}{8}$ percent interest rate, 1976 installation costs, and current normalized prices (7-26-76) for agricultural commodities. Annual project costs, benefits, and benefit-cost ratio are as follows:

1. Project costs are \$213,300.
2. Project benefits are \$255,600.
3. The project benefit-cost ratio is 1.2:1.0.



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PLAN AND ENVIRONMENTAL IMPACT STATEMENT

ROBINSON CREEK WATERSHED

Lincoln County, Oklahoma

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of The National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq)

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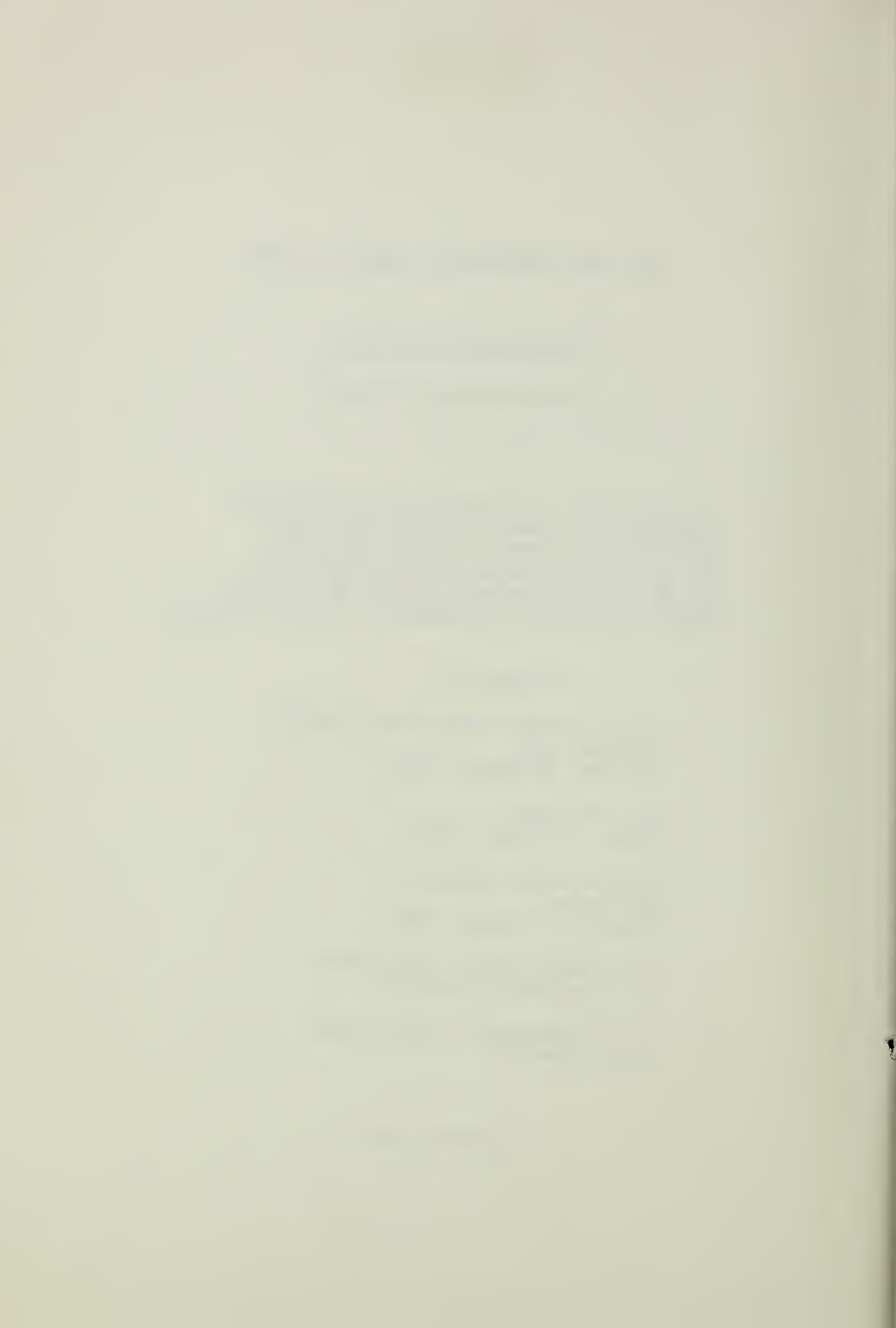
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U. S. Department of Agriculture
Soil Conservation Service

U. S. Department of Agriculture
Forest Service

February 1978



PREFACE

Enclosed are two documents - the Plan and Environmental Impact Statement for Robinson Creek Watershed, Oklahoma.

The Plan has been developed by the local sponsors with the assistance of the U. S. Department of Agriculture and is the basis for the authorization of federal assistance to implement the proposed project in accordance with the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008).

The Environmental Impact Statement has been prepared by the U. S. Department of Agriculture in compliance with Section 102(2) (C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The Environmental Impact Statement contains the detailed information on project area, planned project, problems, impacts, alternatives, resource use, and various appendices.

PLAN 1/

ROBINSON CREEK WATERSHED

Lincoln County, Oklahoma

1/ All information and data, except as otherwise noted, were collected during watershed planning investigations by the SCS, USDA.

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SUMMARY

The watershed covers an area of 40,320 acres (63.0 square miles) in central Oklahoma. Approximately 10 percent of the watershed is cropland, 28 percent is tame pasture, 36 percent is native range, 24 percent is in forest, and 2 percent is in miscellaneous uses.

The sponsors of the project are the Lincoln County Conservation District, the City of Prague, and the Lincoln County Commission.

Annual erosion rates generally range from one to seven tons per acre with the exception of about 18,000 acres which are losing over seven tons per acre. Included in the latter area are over 600 acres of critical areas which are eroding at much higher rates. Flooding affects 2,375 acres during the 100-year flood. Sediment has damaged about 890 acres and erosion has damaged about 440 acres of floodplain. The results are crop and monetary losses as well as environmental degradation. Water based recreation opportunities are needed. The City of Prague is in need of a future water supply.

Goals are to reduce erosion; reduce flood, sediment, and scour damages on the main floodplain areas; to provide water to meet the City of Prague's demand to the year 2005; to provide water based recreation opportunities; and to minimize damages to archeological and historical, fish and wildlife, and similar environmental resources.

This plan provides for land treatment and structural measures. The land treatment phase includes those conservation practices normally installed by and within the financial capability of the landowners and operators and critical area treatment for which additional financial assistance is needed. Through this phase about 1,510 acres of cropland, 4,930 acres of pasture, 4,770 acres of range, and 1,860 acres of forest will receive conservation treatment for adequate protection. The cost for land treatment is about \$2,942,765 of which \$1,848,530 is PL-566 costs and \$1,094,235 is other costs. PL-566 costs are \$110,650 for accelerating technical assistance and \$1,737,880 for cost-sharing for 604 acres of critical area treatment. Structural measures include 10 floodwater retarding and one flood prevention-municipal water-recreation structure, recreation facilities and 95 acres of wildlife plantings for mitigation. Structural measure costs are about \$2,700,300 of which \$787,040 are local and \$1,913,260 are PL-566. The installation period of the planned project is estimated to be eight years. The ratio of average annual benefits to average annual cost is 1.2:1.0.

Critical area treatment (CAT) will be installed through force account and average cost method, and by contract under project agreements between sponsors and the SCS. Other land treatment will be installed by

landowners and operators. The district will provide needed construction permits and ingress rights for maintenance inspections for critical area treatment. The SCS and the Oklahoma Forestry Division, through their going program in cooperation with the U.S. Forest Service, will provide the technical assistance for detailed planning and installation of the land treatment phase. The SCS will administer contracts.

Structures will be installed by federal contract administered by the SCS as requested by the sponsors. Engineering services for the floodwater retarding structures will be provided by SCS. Engineering services for the multipurpose structure and for the recreation facilities will be secured through engineering contracts. The conservation district will secure land and water rights for the floodwater retarding structures and jointly with the City of Prague will secure land and water rights for the multipurpose structure. These rights will include those needed for mitigation measures.

Land rights will be secured by donation or by purchase. The district will use the right of eminent domain where necessary. The City of Prague will provide relocation assistance advisory services at their expense and make relocation payments in connection with project related relocations of persons, businesses, or farm operations for site 4-M. No other relocations were found necessary at the time of the plan preparation. The sponsors and the SCS will each provide the project administration services they require and bear the costs incurred estimated to be \$24,900 and \$366,000, respectively.

The conservation district will operate and maintain the structural measures, including mitigation measures, with the exception of the multipurpose site and the recreation facilities which will be the responsibility of the City of Prague. Operation and maintenance of the 10 single-purpose structures is estimated to be \$2,630 per year. Of this amount, \$1,130 is for the wildlife mitigation measures. The average annual maintenance cost for the multipurpose site is estimated to be \$8,400 for the structure, \$22,200 for the recreation facilities, and \$880 for the associated wildlife mitigation measures.

The environmental impacts of the project are expected to be as follows: Upland erosion, runoff, and flooding will be reduced, as will associated agricultural and non-agricultural damages. The project will directly benefit about 85 landowners and operators, and about 22,000 other persons in the surrounding area. Stream base flows will be stabilized, total sediment yield from the watershed will be reduced, and water quality below the structures will be improved. The appearance of the countryside will be improved, a new recreational facility will be added to the watershed, and a needed source of municipal water will be provided for the City of Prague. Crop yields and pasture feed values will be increased, family farming operations stabilized, and net returns increased for low income farmers. Lives will be protected and employment opportunities will be created. Archeological knowledge will be expanded and sites investigated or salvaged that would otherwise go unrecognized,

or be lost to ongoing destructive processes. Wildlife populations will become more stable in the floodplain due to fewer drownings of young and destruction of den areas by floodwaters and sediment. Wildlife food supplies will also be improved in the floodplain due to reduced sediment deposition and flooding. However, woodland habitat acres in the floodplain will be reduced due to intensification of agricultural production. Woodland wildlife habitat and the populations of woodland species will decrease in the uplands due to the destruction of woodland habitat in the site areas. Openland wildlife habitat will also decrease in the uplands due to the permanent water in the site areas. However, other project land use changes will result in few, if any, adverse impacts on openland wildlife. Populations of water oriented species including migratory waterfowl are expected to increase due to the presence of 450 acres of new habitat in 11 small lakes distributed throughout the watershed. The 450 acres to be occupied by water will be lost to agricultural production for the life of the project. An additional 552 acres in the detention pools will be occasionally inundated which will restrict the agricultural use of this area. There will be limited agricultural use of the 35 acres involved in dams and spillways. There will be an increase in noise, dust, erosion, and turbidity of stream during the construction process. Three farming operations, including one family, will be displaced in the multipurpose site area.

PLANNED PROJECT

This plan includes land treatment and structural measures.

The land treatment phase of the plan includes technical assistance to plan the conservation practices and financial assistance for this installation. Technical and financial assistance will be provided through going program funds of the conservation agencies at least at the rate that existed prior to the development of the plan. PL-566 funds are provided to accelerate the rate of technical assistance to install the conservation practices required to meet the goals of this plan. PL-566 funds will also be provided to cost share in the installation of critical area practices.

Through the land treatment phase of the plan, about 1,510 acres of cropland, 4,930 acres of pasture, 4,770 acres of range, and 2,860 acres of forest will receive conservation treatment for adequate protection. About 604 acres of gullies and critically eroding areas will be stabilized.

Structural measures include 10 single-purpose floodwater retarding structures, a multipurpose floodwater retarding - municipal water supply - recreation structure, and attendant wildlife habitat mitigation measures. Recreation facilities will be installed at the multipurpose site.

Provision is made at the single-purpose sites for 100-year sediment storage. The crests of the principal spillways will be set at the 50-year sediment storage elevations. Storage of water to the 100-year sediment storage elevations may be allowed where water rights are obtained. ^{1/} Table 3 presents physical data about the structural measures.

The reservoir structures will control about 29.32 square miles of drainage area, about 46.5 percent of the watershed.

The minimum area on which land rights will be acquired for structural measures is 1,290 acres. This includes 522 acres to be acquired in fee title at the multipurpose site for the structure, recreation facilities, and 52 acres of wildlife mitigation measures. Easements will be acquired for 725 acres for the single-purpose sites and for 43 acres for wildlife mitigation measures.

^{1/} Oklahoma Water Resources Board Resolution adopted 1/10/61 governs principal spillway riser elevations, minimum discharge pipe capacity, and water rights in floodwater retarding structures.

Recreation facilities include about 4.5 miles of trails, 2.25 miles of asphalt roadways, 4,800 square yards of parking lots, 2 comfort stations, 1 water supply, one 20' x 20' group picnic shelter, 20 3' x 6' picnic tables, 6 cooking grills, 15 camp sites, 1 boat dock, 1 boat launching ramp, and 1 fishing dock. About 60 acres of vegetative plantings will be installed on about 210 acres of land surrounding the multipurpose structure.

Reasonable precautions will be taken during construction of the project to minimize soil erosion, water and air pollution. The area and duration of exposed areas will be kept to a minimum.

Should archeological or historical resources be uncovered or brought to the attention of SCS before or during construction, notification will be made and actions will be taken in compliance with PL-93-291. This is a federally assisted project and there will be no changes in the existing responsibility of any federal agency under Executive Order 11593.

INSTALLATION COSTS - MONETARY

Costs reflected in this plan are estimated based on computed amounts and 1976 prices plus a contingency allowance to account for unforeseen items. A contingency allowance of 15 percent is used unless otherwise specified.

The project cost of \$5,643,065 includes \$2,942,765 for the land treatment phase and \$2,700,300 for the structural phase. About \$3,761,790 of the project cost will be from PL-566 funds and \$1,881,275 will be from other funds.

Land treatment costs, estimated to be \$2,942,765, include \$497,000 to continue the going program and \$162,200 to accelerate the going program plus \$2,283,565 for critical area treatment.

The SCS will provide about \$31,600 for funding the technical assistance to continue the going program. The SCS will provide about \$110,650 from PL-566 funds for technical assistance to accelerate the rate of conservation practice installation and to install the critical area treatment. The Oklahoma Forestry Division under their going program with the U. S. Forest Service will provide about \$550.

Installation costs for the critical area treatment will be from funds of the affected landowners and operators and from PL-566 funds. Funding for other land treatment programs will be from funds of the landowner or operator with cost sharing assistance provided by the ASCS or other cost sharing programs.

Installation costs for structural measures are estimated to be about \$2,700,300 and include construction, land rights, engineering services, relocation payments, and project administration. The amount of costs in these categories are itemized in Tables 1 and 2 of this plan. About \$1,913,260 of the installation cost for structural measures will be from PL-566 funds and about \$787,040 will be from other funds. Specific cost sharing percentages for the above cost categories for the structural measures are reflected in the plan agreement.

Construction costs are made up of the following costs: 1) timber clearing in site areas; 2) wildlife mitigation measures; 3) flagmen and protective devices to protect the public or the workmen; 4) borrow material when actually purchased by the sponsors; 5) construction of handrails, fences, gates, etc., needed for the proper functioning and operator's safety of a structural measure including any safety features needed for public recreation or fish and wildlife measures in a project; 6) premiums for construction liability insurance when the construction contractor is made the principal; 7) establishment of vegetation on all construction sites and areas disturbed during construction to prevent

erosion, improve stability, and to restore or maintain wildlife habitat and the esthetic quality of the environment. This includes herbaceous and woody plantings for erosion control, wildlife food, shelter, and walkways. These plantings can also be used for screening or improving the appearance of structural measures.

Engineering costs include the costs for detailed geologic investigations, soil testing, detailed surveys, preparation of designs, plans and specifications, etc., for the structural measures. This cost reflects the value of engineering services to be provided by the SCS and the estimated price for engineering services to be secured through contract with consultants for the multipurpose structure and the recreation facilities.

Land rights costs include the estimated value of costs for lands to be acquired in fee title; easements; removal, relocation, or modification of existing telephone, power, gas, water, and sewer lines or other utilities; removal of buildings or improvements for salvage or relocation, or the construction of dikes or other protective works; all new or changes of existing public or private roads; all relocations and changes of roads and railroads that are to remain serviceable after project installation; relocation or reconstruction of fences not required for proper operation of the project; installation of new fences or guardrails for protection or safety of the public; salvaging fences or timber; and some liability insurance costs. The costs for land rights includes the fee title price, engineering survey and legal costs, and the costs for relocation, modification, or removal of facilities.

Relocation payment costs, about \$18,000, are estimates of payments to be made in connection with persons, businesses, or farm operations displaced as a direct result of land rights acquisition. Payments are made to cover the costs of moving and related expenses for a displaced person, business, or farm operation as well as financial assistance for replacement housing for a displaced person, in some instances. Relocation payments are expected to occur only in connection with the multipurpose site. The other 10 structures are not expected to involve any displacements.

Costs for project administration services are estimated to be about \$390,900. These services include relocation assistance advisory services, administrative functions connected with relocation payments, securing permits for project installation, contract administration, review of engineering plans prepared by others, government representatives, and inspection services during installation. Relocation assistance advisory services costs are estimated to be about \$1,300 and must be provided by the sponsors without PL-566 costs sharing.

The total cost of the 10 single-purpose structures of \$1,056,400 includes construction, \$848,500; engineering \$108,900; and land rights, \$99,000. These land rights include land \$72,000; legal fees, \$1,000; and roads and bridges, \$26,000.

The costs for the 10 single-purpose structures were allocated entirely to flood prevention. The costs of the multipurpose site were allocated to three purposes; flood prevention, recreation, and municipal water supply. Joint construction, engineering, and relocation payment costs are allocated based on the capacity provided in the reservoir for each purpose (flood prevention 2,146 acre-feet, municipal water supply 1,703 acre-feet, and recreation 248 acre-feet). The construction and engineering costs for the municipal water supply inlet structure are allocated to the municipal water supply purpose. The costs for land rights for the 522 acres to be acquired in fee title were allocated between municipal water and recreation, based on the surface area required for each purpose (municipal water, 123 acres, and recreation, 399 acres). The costs for flowage easements were allocated to flood prevention. The land rights for basic recreation facilities are single purpose and are allocated to recreation. Construction and engineering costs for recreation facilities are allocated to the recreation purpose.

Table 2A shows the cost allocation and sharing by purpose for the multipurpose structure. Table 2B shows the cost of the recreation facilities. Specific amounts of cost sharing are shown in the Agreement Section, page P-24.

The total estimated costs of establishing multipurpose structure 4-M is \$1,253,000 of which \$663,140 will be borne by the City of Prague and \$589,860 by Public Law 566. The funds provided by the City include construction \$415,500, engineering \$35,300, land rights \$207,500, and relocation payments \$4,840. Public Law 566 funds include construction \$420,900, engineering \$36,100, land rights \$119,700, and relocation payments \$13,160. Cost allocation for the multipurpose structure is shown on the following table.

MULTIPURPOSE STRUCTURE - COST ALLOCATION

Cost Category	Total Cost (dollars)	Allocated Costs		
		Flood Prevention (dollars)	Recreation (dollars)	Municipal Water Supply (dollars)
Construction				
Joint	511,000	267,700	31,000	212,300
Inlet Structure	50,000	-	-	50,000
Recreation Fac.	275,400	-	275,400	-
Engineering				
Joint	40,600	21,300	2,400	16,900
Inlet Structure	6,000	-	-	6,000
Recreation Fac.	24,800	-	24,800	-
Relocation Payments ^{1/}	18,000	9,430	1,090	7,480
Land Rights				
Fee Title 522 ac.	313,200	-	239,400	73,800
Eng. Survey and Legal Fees	2,000	-	1,000	1,000
Alt. or Mod. of Improvements	10,000	-	10,000	-
Flowage Easements	2,000	2,000		
Total	1,253,000	300,430	585,090	367,480

^{1/} Relocation costs are shared between PL-566 and other funds on the basis of PL-566 and other project costs less the relocation payments as shown in Table 1.

ECONOMIC BENEFITS

The total average annual benefits resulting from the installation of structural measures are estimated to be \$255,600 (Table 6). Of this total, about \$81,600 are flood damage reduction benefits. Included in the flood damage reduction benefits are \$40,500 for less flooding, \$15,700 for reduced sediment deposition, \$4,900 for less floodplain scouring, and \$20,500 for a reduction in indirect damages. More intensive land use will provide \$45,800 in benefits.

Since the watershed is located in an area designated by the Secretary of Agriculture as eligible for rural area development under the Economic Development Act of 1965, employment benefits are used for project development. The employment benefits accrue through the employment of unemployed and under-employed during the installation of the project. The average annual amount of these benefits is estimated to be \$14,500.

The average annual municipal water supply benefits accruing as a result of municipal water storage in multipurpose site 4-M are estimated to be \$38,000. Municipal water supply benefits were determined by the consulting engineer for the City of Prague.

The average annual recreation benefits from public use of the recreational facilities and water storage in the multipurpose site will amount to \$75,700.

Total average annual benefits of the project are estimated to be \$255,600, while total average annual costs are estimated to be \$206,600. The ratio of average annual benefits to average annual costs is 1.2:1.0.

INSTALLATION AND FINANCING

LAND TREATMENT

Land treatment will be installed through cooperation of landowners and operators with their conservation district. Land treatment falls into two categories from the standpoint of installation. The first category includes those conservation practices normally installed by owners and operators with financial assistance available through going conservation programs. Measures in this category together with accelerations needed to meet the goals of this plan will be installed by the owners and operators. The soil conservation district will provide leadership. The SCS and the Oklahoma Forestry Division will provide technical assistance. The owners and operators will utilize cost-sharing assistance available for eligible measures. The second category includes critical area treatment for active gullies and badly eroded areas. Treatment costs are outside the financial capabilities of landowners and operators with technical and financial assistance available. These measures will be installed with technical and financial assistance from PL-566 funds as outlined below.

Critical area treatment will be a part of agreed-to conservation practices included in new or revised conservation plans for each affected operating unit. These conservation plans will include an installation schedule; requirements for operation, maintenance and replacement; provision for access by SCS and the district or its agent to inspect installation and operation and maintenance; and signatures by the district and the owner or operator. These plans will serve as the operation and maintenance agreement. The conservation district will provide the leadership and coordination. The SCS will provide technical assistance through the conservation district for preparation of the conservation plan, installation plans, standards and specifications, and for layout and inspection of construction. The Oklahoma Forestry Division, through their going program in cooperation with the U. S. Forest Service, will furnish technical assistance for the forest related practices.

Immediately before installation, the sponsor (the affected County Commissioner or Conservation District) and the SCS will enter into a project agreement for all or part of the work included in a conservation plan or several conservation plans. The project agreement will cover work that can be started in 90 days and completed within 18 months. Each project agreement will describe the critical area treatment to be installed and (except for the average cost method) the method of installation, the cost-sharing rates or arrangements, technical assistance for installation, duration of agreement, inspection, and related subjects.

Installation of critical area treatment will be through force account, by the average cost method, and by contract.

Force Account

The county commission will secure needed landrights and construction permits and install the critical area treatment in accordance with the terms of the project agreement executed immediately before the work commences. The county labor force and equipment will be used to install the critical area treatment. Minor amounts of equipment may be secured through rental. The county commission will maintain cost records of work performed in terms of equipment, materials, and labor. The SCS will reimburse the county commission for work performed through each project agreement on the basis of 80 percent of the actual cost of the work. The county commission will comply with all applicable local, state, and federal regulations in installing the critical area treatment.

The project agreement will contain work that can be started within 90 days and completed within 18 months and be supported by necessary designs and drawings and cost estimates prepared immediately before signing the document. It will include itemized units of work and estimated costs of labor, equipment, and material required to install each unit and the estimated total cost of the work.

The project agreements containing work in excess of \$30,000 in cost will be submitted to the Washington office of the SCS for approval. The request for approval must be supported by a comparative cost analysis for installation by federal contract and by force account. A savings of 10 percent must be realized before force account may be used.

Average Cost Method - This method applies to critical area treatment for individual farms and ranches.

In addition to the general content described above, the project agreement will include the names of the cooperators on whose land work is to be accomplished, the cost-share rate, and the total of such work covered by the project agreement. In addition, the agreement will provide for the sponsor to enter into individual agreements with each cooperator to provide for actual installation of work.

The sponsor-cooperator agreement will provide for installing the critical area treatment on each cooperator's operating unit in accordance with a conservation plan of operations and installation schedule within an 18-month period. The cooperator involved may install the treatment using his own labor and equipment or employ the services of vendors and contractors to install the measure. Landrights are provided by the cooperator through the district agreement.

The SCS will share in the cost of installed critical area treatment based on a percentage of the average cost when the cooperator installs the work using his own forces, or on a percentage of the actual cost not to exceed the average cost for any component of the work installed by a vendor or contractor. Average costs are determined from actual costs for similar work recently installed in the general area.

Upon completion of a practice or component of a practice by a vendor or contractor, the cooperator will provide the district with records to show actual cost of the work. The district will take steps necessary to ensure that cost records of work that the cooperator has performed by vendors and contractors are suitable to base a claim to SCS for the PL-566 share of the costs.

Contract

The critical area treatment planned for a single farm or ranch, or a group of farms or ranches, may be installed by federal contract at the option of the SCS, the conservation district, and the affected landowners or operators. The district will provide such land rights as may be required. The SCS will administer the contracts as requested by the conservation district. The conservation district will work with SCS in installation of the work and in administering any contracts.

Standard project agreements between the SCS and the conservation district will be used when federal contracts are used to install all of the treatments on one or more operating units. Sponsors will deposit with the SCS the estimated local share of the estimated cost prior to awarding the contract.

STRUCTURAL MEASURES

Sponsors will acquire land rights for structures and associated mitigation measures.

The Lincoln County Conservation District will provide, at no cost to the federal government, all the land rights for the single-purpose flood-water retarding structures. They will also provide for the relocation, removal or modification of any roads, utilities, pipelines, or other improvements that might hamper construction of the structural measures. The City of Prague will provide the same land rights, etc., for the multipurpose site.

The sponsors will acquire the permits and landrights through donation, purchase from willing sellers, or through the use of their power of eminent domain. The conservation district and the City of Prague each has the power of eminent domain.

The sponsors will provide for all surveys and legal work needed for acquisition of permits and land rights without PL-566 cost sharing. The sponsors must have the land rights appraised by qualified appraisers prior to initiation of negotiations. This will establish prices for these interests where they are to be acquired through means other than donation. Landowners will be given an opportunity to accompany the appraisers in reviewing the land rights to be acquired.

About 522 acres of land will be acquired in fee title for multipurpose structure 4-M, the recreation facilities, and 52 acres of wildlife mitigation plantings. Easements will be sufficient for other structures and associated mitigation measures.

The City of Prague will acquire the needed water rights for municipal water supply and recreation capacity in multipurpose site 4-M. Individual landowners involved in the single-purpose floodwater retarding structures must acquire water rights needed for storage of water in excess of the 50-year sediment volume. Where such storage is needed for environmental purposes, the conservation district will assist the landowner in acquiring the rights.

The SCS will provide engineering services required for detailed investigations including geologic investigation and engineering surveys, and for preparation of plans and specifications for the 10 floodwater retarding structures. Similar engineering services for multipurpose structure 4-M and the recreation facilities will be secured through engineering contracts negotiated by the City of Prague.

The SCS will provide technical assistance for development of erosion control plans at the structure sites and for the 95 acres of wildlife plantings to mitigate wildlife habitat losses. The U.S. Fish and Wildlife Service may, at their election, assist in the design of the habitat plantings.

The SCS and the sponsors will each provide the project administration services they require. SCS will review engineering plans prepared by others for multipurpose site 4-M and the recreation facilities; administer construction contracts for structural measures; furnish a government representative and construction inspection; and provide related clerical and administrative services. In connection with construction inspection at multipurpose site 4-M, the SCS will inspect those features related to the joint features and the specific features related to the flood prevention and recreation purpose and where malfunction or failure could adversely affect these features, it will inspect the specific municipal water supply features. The conservation district will provide relocation assistance advisory services in connection with relocations of persons, business and farm operations as described below, and general administration, clerical, and construction inspection services required to insure that the structures are installed as planned. The City of Prague will provide construction inspection relating to the municipal water supply features of multipurpose site 4-M.

The sponsors have requested that the SCS administer construction contracts. The conservation district will work with the SCS in administering construction contracts for the 10 floodwater retarding structures. The City of Prague will work with the SCS in administering contracts for multipurpose structure 4-M and the recreation facilities.

The Lincoln County Conservation District will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-647, 84 Stat. 1894) effective January 2, 1971, and the regulations of the Secretary of Agriculture pursuant thereto in acquiring land rights.

The City of Prague will provide relocation assistance advisory services, other related services, and make relocation payments in connection with

displacements involved in the acquisition of land rights for multipurpose structure 4-M. The city will, (1) provide personally or by first class mail, written notice of displacement and appropriate application forms to each displaced person, business or farm operation, (2) assist in filing applications, (3) review and process grievances in connection with displacements, and (4) make relocation payments. The SCS, as a part of project administration may assist the district in these actions. The sponsors will, without PL-566 cost-sharing, provide relocation assistance advisory services as outlined below:

1. Assist in determining the needs for relocation assistance.
2. Make available current and continuing information on the availability, prices and rental rates of comparable decent, safe and sanitary sales and rental housing, and comparable commercial properties and farms.
3. Assure that within a reasonable period of time prior to anyone having to move from acquired dwelling, there will be available a decent, safe and sanitary replacement dwelling.
4. Provide assistance to anyone displaced from his business or farm operation by the project and help him in obtaining and becoming established in a suitable replacement location.
5. Supply to displaced persons information concerning federal and state housing programs, disaster loan programs, and other federal or state programs which offer various types of assistance or service to such persons.
6. Provide such personal counseling and other advisory services as may be desired in order to help individuals relocate with the least amount of hardship and problems.
7. Assist individually in preparing their application for relocation payments for which they may be eligible.

The city has determined that decent, safe, and sanitary replacement housing will be available for all persons displaced by the project. Displaced persons will be given at least 90 days notice before they have to move.

Although planning studies show that relocations of persons, business or farm operation are only necessary for multipurpose site 4-M, each sponsor will carry out its responsibilities with the conditions that exist when landrights are acquired.

Land treatment and structural measures will be installed over an 8-year period. The installation schedules will be adjusted on a year-to-year

basis to reflect changes mutually agreeable to sponsors and the SCS. An estimated schedule for obligation of funds follows:

Fiscal Year	Public Law 566 Funds		Other Funds		Total
	Land Treatment	Structural	Land Treatment	Structural	
	Measures (Dollars)	Measures (Dollars)	Measures (Dollars)	Measures (Dollars)	
1	300,000	80,000	150,000	100,000	630,000
2	300,000	150,000	150,000	51,500	657,500
3	300,000	149,970	150,000	50,030	650,000
4	400,000	600,000	150,000	127,800	1,177,800
5	200,000	260,000	150,000	100,000	710,000
6	200,000	260,000	150,000	135,000	745,000
7	150,000	260,000	100,000	125,000	635,000
8	98,530	153,290	94,235	91,710	437,765
TOTAL	1,848,530	1,913,260	1,094,235	787,040	5,643,065

PL-566 technical and financial assistance for land treatment measures will be provided immediately upon authorization based upon the above conditions.

PL-566 assistance for structural measures is subject to the following conditions:

1. 50 percent of the land above structural measures is under conservation agreement to apply, operate and maintain needed conservation treatment.
2. 75 percent of the critically eroding sediment source areas that would significantly affect the design and operation of structural measures have been treated or are being treated concurrently with the installation of structural measures.
3. Sponsors have demonstrated their willingness and ability to acquire and pay for the necessary land rights using their power of eminent domain when necessary.
4. Have obtained, or have options to obtain, land rights for 2 years construction work within a construction unit.
5. Have executed necessary project land rights and operation and maintenance agreements.

Sponsors have analyzed their financial needs for installation and operation, maintenance and replacement and have provided assurance to the SCS that funds will be available at the time and in the amounts required.

It is expected that land rights for the floodwater retarding structures, and for the wildlife mitigation measures, will be acquired largely through donations. This is supported by attitudes of affected landowners and through experience in other watershed projects in Oklahoma. Land rights that must be purchased will be financed through state watershed revolving funds and by other revenues of the Conservation District.

The City of Prague expects to secure a FmHA loan to offset part of its cost for multipurpose structure Site 4M if adequate funding is not available from other sources. The possibility of this loan has been discussed with SCS and FmHA.

The SCS will provide financial assistance for works of improvement as described in this plan under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666) as amended. Installation of land treatment measures will be funded not only through the PL-566 program but also through other programs. The ASCS will provide financial assistance for installation of many of the land treatment measures applied while the technical assistance will be provided through SCS funds. The FmHA is a source of funds for the sponsors to use in carrying out their portion of the planned project which cannot be financed through other sources.

The Soil Conservation Service recognizes that archeological sites undetectable from surface evidence may be unearthed by construction activities. If such a discovery is made, the procedures required by Section 3 of PL 93-291 will be followed and salvage or preservation needs will be determined. The National Park Service has been designated as the responsible agency for the salvage or preservation of archeological or historical materials by Public Law 93-291.

Since this is a federally assisted local project, there will be no change in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archeological and historical resources.

Prior to entering into agreements that obligate funds of SCS, the Lincoln County Conservation District will develop a code of conduct governing the performance of its officers, employees, or agents in contracting with or expending PL-566 funds; and a financial management system for control, accountability, and disclosure for PL-566 funds received and for control and accountability for property and other assets purchased with PL-566 funds.

Program income earned during the grant period will be reported on the sponsor's request for advance or reimbursement from SCS.

OPERATION, MAINTENANCE AND REPLACEMENT

Measures in this plan will be operated and maintained by sponsors and landowners or operators with technical assistance from local, state, and federal agencies in accordance with their delegated authorities. A specific operation and maintenance plan will be prepared for each structural measure utilizing the watershed operations and maintenance handbook adopted for watersheds in Oklahoma. The land treatment measures will be operated and maintained in accordance with the conservation plan for each operating unit.

Land Treatment

The Lincoln County Conservation District and the Lincoln County Commission are responsible for operation, maintenance, and replacement (OM&R) of the land treatment phases of this plan. The district and the commission will carry out their responsibilities for both private and public land through agreements with landowners and operators who will install, operate, maintain, and replace damaged or short life elements of the land treatment and adopt management measures outlined in conservation plans for each operating unit. The county commission will operate and maintain the CAT work installed on county roads in accordance with the OM&R agreement developed for each specific project.

Establishment and OM&R of the critical area treatment is particularly important. Each conservation plan for farms, ranches or county road systems covering critical area treatment will include provisions for operation, maintenance and replacement and provide for access by the district, the SCS, or other federal, state, or local agencies providing technical assistance (through or acting for the district) to inspect the measures. Each such conservation plan agreement will be signed by the conservation district, and the owner or operator, and will serve as the OM&R agreement. A period of two years after initial installation is allowed for establishment including both structural and vegetative components. During this period the SCS will cost-share in repairs on the same basis as for initial installation. The critical area treatment will be inspected annually, after rain, drought, fire or other occurrences that might adversely affect the treatment. The district, the SCS, and the Oklahoma Forestry Division will perform the inspections for the first three years. The district will make the inspections for the next seven years after which inspections will be discontinued. The district will prepare reports setting forth the conditions of the treatment and any OM&R needs after each inspection and furnish the SCS a copy of the report. The district will follow up with landowners and operators to accomplish the OM&R needs.

Operation may include those activities, such as mowing, fertilizing, removal of debris and obstructions which will enable the measures to function as planned. Maintenance includes timely repairs such as filling of eroded areas, replanting to vegetation, and repairing of

damaged concrete, pipe, or similar elements. Replacement includes replacement of badly damaged sections of concrete, pipe, fences, or similar appurtenance as needed for continued operation.

Establishment and OM&R of other land treatment measures are also vital in achieving the objectives of this plan. The district and the SCS will make periodic reviews of the status of installation and periodic inspections of measures installed to determine any OM&R needs. Conservation plans will be updated as needed. The district will follow up with landowners and operators to accomplish the needed work.

Technical assistance for installation and OM&R of the land treatment phase of this plan will be provided by SCS, the Oklahoma Forestry Division through their going program in cooperation with the U. S. Forest Service, and other federal, state, and local agencies through the Conservation District in accordance with agreements between the agencies and the district.

Landowners and operators and county commissioners will operate, maintain, replace elements of the land treatment, and bear the costs incurred. The district may lend, rent, or perform part of the work with district equipment and manpower. Cost-sharing assistance available through the ACP or other federal programs may be utilized as available.

Structural Measures

The Lincoln County Conservation District and the City of Prague will operate and maintain the structural measures including appurtenances and the associated wildlife habitat areas. They will replace worn or inoperative elements when needed. The Lincoln County Conservation District is responsible for OM&R in connection with sites 1, 2, 3, and 5 through 11. The City of Prague is responsible for OM&R in connection with multipurpose structure 4-M including the recreation development and wildlife mitigation measures associated with that site.

Operation of the structural measures, appurtenances and associated wildlife habitat areas will include management to insure that they perform the functions for which they were planned. For the reservoirs, dams and spillways, this will consist of inspection and actions to prevent the principal and emergency spillways from being altered or obstructed, and to insure that water quality in connection with the multipurpose structure remains suitable for municipal water supply and recreation purposes.

It is particularly important that the spillway areas, the floodwater detention storage areas and the recreation facilities area be kept free of unauthorized buildings, fences, roads, etc., that might impair

the operation of the structures or the recreation development. The City of Prague understands that the lands acquired in fee title for multipurpose site 4-M and the recreation development are to be kept from private development except for essential service facilities which may be constructed or operated by private concessionaires on a controlled permit basis to serve the planned use of the improvement or development.

Operations of the multipurpose structure site 4-M will involve the withdrawal of water for municipal water supply purposes and the maintenance of the recreation pool above elevation 856.7 feet MSL. Operation studies which took into account water yield from the drainage area above site 4-M, maximum water supply demands, and evaporation and seepage losses show that the water level of the reservoir can be maintained above elevation 856.7 feet MSL. (See Fig. 1, P-23.) The City of Prague will notify the SCS through the state conservationist if drawdown below the specified elevation is necessary. If it is determined that there is a continuing need for the use of recreation storage for municipal water supply purposes, the City of Prague will reimburse the federal government for all of the PL-566 funds used for the recreation development associated with that reservoir. Operation of the recreation facilities and the recreation development includes custodial, sanitation, policing, safety, and similar services. A frequent check will be made of the facilities and their use to insure that the development is functioning as planned. Collection and disposal of solid waste in connection with operation and maintenance of the recreation facilities will be handled by the City of Prague Sanitation Department in the same manner as for the city.

The City of Prague will comply with Oklahoma State Health Department and Federal regulations governing sanitation, water quality, or chemical usage, in connection with the multipurpose reservoir and the recreation development. The Oklahoma State Health Department and the City of Prague will jointly monitor sanitation and water quality. The County Health Department will monitor sanitation in connection with the recreation area.

The sponsors and the landowners and operators will operate and maintain fish and wildlife phases of the plan. Wildlife mitigation areas will be fenced, except at the multipurpose site, so that grazing or other uses may be restricted. The Oklahoma Department of Wildlife Conservation, the U. S. Fish and Wildlife Service, and the SCS, will provide technical assistance in the operation and maintenance of the fish and wildlife resources of the watershed. Grazing or other use of mitigation areas will not be allowed without prior approval of the above agencies.

Maintenance of the earth dams, principal and emergency spillways and reservoir areas includes such items as: replacement of soil removed by rodents; clean out of relief wells and drains; repair of damaged riprap; stabilization of slide areas; maintenance of dikes and fills at proper elevation; replacement of eroded material in spillways, and on dams and perimeter areas; immediate revegetation as needed, and mowing; as well

as control of undesirable vegetation, fertilizing, controlled grazing, and removal of trash and debris likely to clog spillways or adversely affect operation. Maintenance of the recreation development includes many of the above items in addition to timely repairs of the facilities to correct problems resulting from vandalism, normal use, and natural occurrences.

Replacement in connection with all structural measures includes replacement of badly damaged elements or short life elements at the end of their useful life. Examples include replacement of fences, relief well casings and drains, trash racks, gates and valves, risers, picnic tables and other recreation facilities.

Annual OM&R costs for the structural measures, including mitigation, is estimated to be \$34,110. OM&R costs for the single-purpose structures are estimated to be \$2,630. OM&R costs for the multipurpose site are estimated to be \$31,480 of which \$22,200 is for the recreation development. The City of Prague will secure funding for OM&R for the multipurpose site and recreation facilities from its regular sources of revenue, including taxation. The conservation district will secure funding for OM&R of the single-purpose structures from revenues for services they provide, through donations, and through financial assistance from the Oklahoma Conservation Commission. Funds are appropriated annually by the Oklahoma legislature for use by the commission. Appropriations and assistance to conservation districts by the commission have been adequate over the years for OM&R needs in similar projects.

The City of Prague will comply with any National, State, or local regulations pertaining to operation of the water treatment facility.

Specific operation and maintenance agreements between the SCS and the sponsor responsible for operation and maintenance of each structural measure, including the mitigation measures, will be executed prior to signing a land rights, relocation or project agreement. The OM&R agreement will detail specific operation and maintenance responsibilities of sponsors and include specific provisions for retention, use and disposal of property acquired or improved with PL-566 cost-sharing.

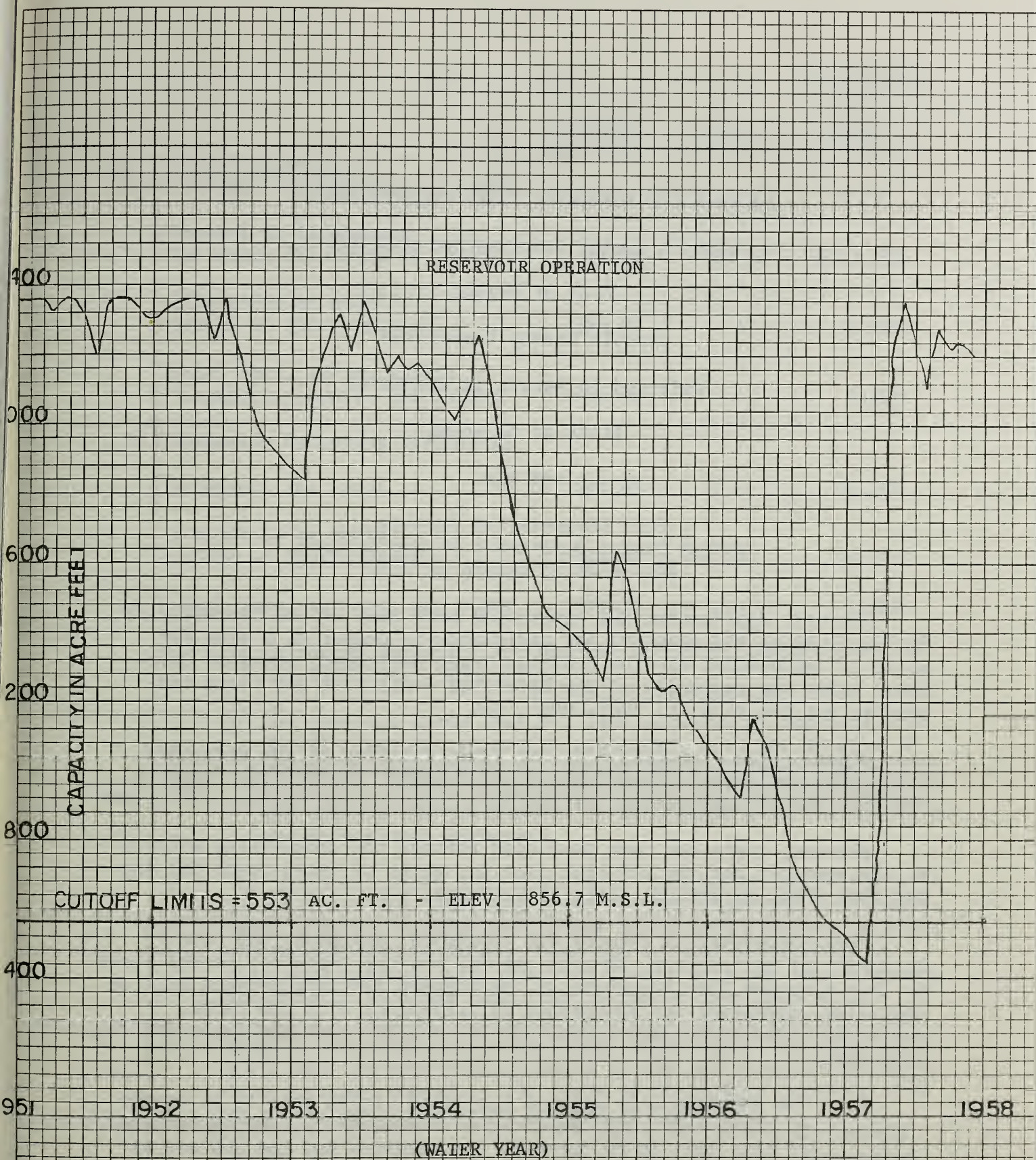
Upon completion of installation, which includes revegetation and the associated wildlife mitigation areas, the sponsors will accept the structures for operation and maintenance. A three-year period is allowed for establishment of vegetation. During this period any required revegetation will be cost-shared with PL-566 funds on the same basis as for the initial installation. PL-566 funds shall not be used to make repairs to correct problems resulting from poor operation or maintenance or for replacement of short life elements of the structures.

Operation, maintenance, and replacement for the measures included in this plan have been discussed between the sponsors and the SCS and the sponsors understand their obligations. The conservation district has an employee who provides maintenance support. In addition, the Oklahoma Conservation Commission has pledged funds, to be provided on an annual basis, to assist the sponsors with OM&R expenses for each structural measure completed.

To guide or monitor operation, maintenance, and replacement, inspections will be made annually, after unusually severe floods, or after other occurrences which would result in unusual conditions that might adversely affect the structural measures. These inspections will be made by the sponsors and the SCS for the first three years, and by the sponsors thereafter. The sponsors will prepare reports of the inspections detailing the need for operation, maintenance, and replacement and provide SCS with a copy.

The city does not plan to impose use charges. However, should they later find this action necessary, any use charges will be limited to that required to repay their investment for the recreation development and for operation and maintenance expenses.

The sponsors will take such action as needed to accomplish the needed work. The SCS and other local, state and federal agencies will provide technical assistance in accordance with their delegated responsibilities and authorities.



ROBINSON CREEK - SITE 4M (OKLA) PRAGUE MULTI-PURPOSE (MR)

FIGURE 1

AGREEMENT

between the following local organizations:

Lincoln County Conservation District

City of Prague

Lincoln County Commission

(Referred to herein as sponsors)

State of Oklahoma

and the

Soil Conservation Service
United States Department of Agriculture
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsors for assistance in preparing a plan for works of improvement for the Robinson Creek Watershed, State of Oklahoma, under the authority of the Watershed Protection and Flood Prevention Act (16 U. S. C. 1001-1008), and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Soil Conservation Service (SCS); and

Whereas, there has been developed through the cooperative efforts of the sponsors and the SCS this plan for works of improvement for the Robinson Creek Watershed, State of Oklahoma; and

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through the SCS and the sponsors, hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

1. The sponsors will acquire such land rights as will be needed in connection with the works of improvement. The percentages of this cost to be borne by the sponsors and the SCS are as follows:

	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Landrights Costs</u> (dollars)
Multipurpose Structure Site 4-M and Recreation Facilities			

Payment to landowners for about 522 acres of land ^{2/}	61.78	38.22	\$313,200
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Alteration or modifi- cation of improvements ^{1/}	100.00	-	10,000
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Legal fees, survey costs, flowage easements, and others	100.00	-	4,000
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10 Floodwater Retarding Structures

Easements and Lands	100.00	-	72,000
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Alteration or modifi- cation of improvements ^{1/}	100.00	-	26,000
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Legal fees, surveys, and other	100.00	-	1,000
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^{1/} Including necessary engineering services, construction, and additional land costs.

^{2/} The sponsors agree that all land acquired or improved with PL-566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement.

2. The sponsors assure that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the sponsors and SCS as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Relocation Payments Costs</u> (dollars)
Relocation payments	26.9	73.1	\$18,000

3. The sponsors will acquire or provide assurance that land-owners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.
4. The percentages of construction costs to be paid by the sponsors and by SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Construction Costs</u> (dollars)
Multipurpose Structure Site 4-M			
Joint construction	55.42	44.58	\$511,000
Water Supply Inlet tower	100.00	-	50,000
Recreation Facilities	50.00	50.00	275,400
10 Floodwater retarding structure	-	100.00	848,500

5. The percentage of installation costs of the critical area treatment measures to be paid by the Sponsors and by the SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Installation Cost</u> (dollars)
Critical Area Treatment			
On farms and ranches	20.00	80.00	340,565
On county road systems	20.00	80.00	1,831,800

6. The percentages of the engineering costs to be borne by the sponsors and the SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Engineering Costs</u> (dollars)
Multipurpose Structure Site 4-M			
Joint Engineering	41.57	58.43	\$ 40,000
Water Supply Inlet Tower	100.00	-	6,000
Recreation Facilities	50.00	50.00	24,800
10 Floodwater Retarding Structures	-	100.00	108,900

7. The sponsors and SCS will each bear the costs of Project Administration which it incurs, estimated to be \$24,900 and \$366,000, respectively.
8. The sponsors will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.
9. The sponsors will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.
10. The sponsors will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.
11. The sponsors will be responsible for the operation, maintenance, and replacement of the works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.
12. The costs shown in this plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.
13. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

14. A separate agreement will be entered into between SCS and sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
15. This plan may be amended, revised, or terminated only by mutual agreement of the parties hereto except that SCS may terminate financial and other assistance in whole, or in part, at any time it determines that the sponsor has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsor in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the sponsor or recoveries by SCS under projects terminated shall be in accord with the legal rights and liabilities of the parties. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the sponsor having specific responsibilities for the measure involved.
16. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
17. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.
18. This agreement will not become effective until the SCS has issued a notification of approval and authorizes assistance.

Lincoln County Conservation Dist. By _____
Title _____
Address _____ Zip Code _____ Date _____

The signing of this plan was authorized by a resolution of the governing
body of the _____ Lincoln County Conservation District
adopted at a meeting held on _____

Secretary _____ Address _____ Zip Code _____
Date _____

City of Prague By _____
Title _____
Address _____ Zip Code _____ Date _____

The signing of this plan was authorized by a resolution of the governing
body of the _____ City of Prague
adopted at a meeting held on _____

Secretary _____ Address _____ Zip Code _____
Date _____

Lincoln County Commission By _____
Title _____
Address _____ Zip Code _____ Date _____

The signing of this plan was authorized by a resolution of the governing
body of the _____ Lincoln County Commission
adopted at a meeting held on _____

Secretary _____ Address _____ Zip Code _____
Date _____

Appropriate and careful consideration has been given to the environmental
impact statement prepared for this project and to the environmental
aspects thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

Roland R. Willis
State Conservationist

Date

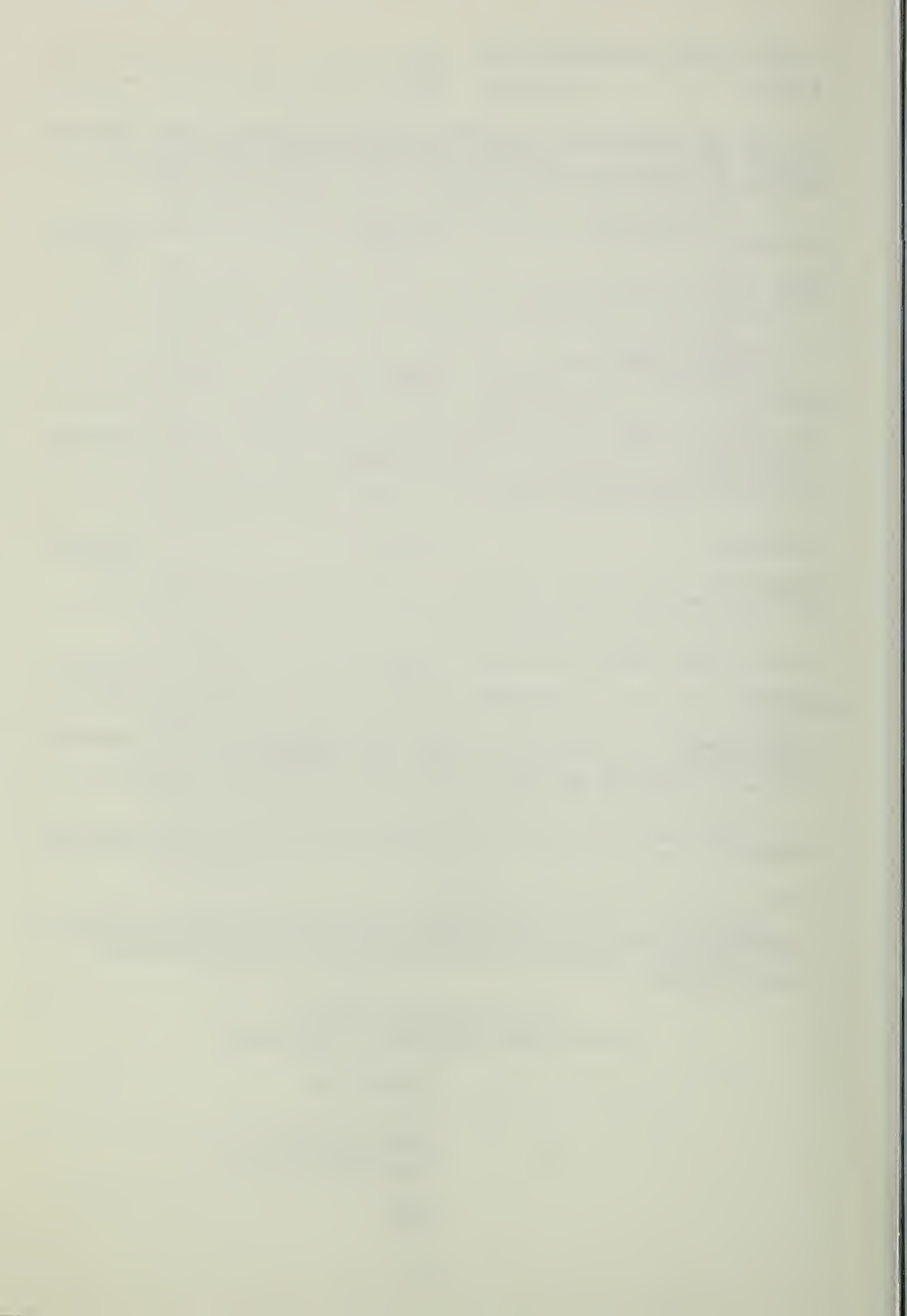


TABLE 1 - ESTIMATED PROJECT INSTALLATION COST

Robinson Creek Watershed, Oklahoma

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) ^{1/}			
			P.L.566 Funds	Other Funds		Total
			SCS	FS ^{2/}	SCS ^{2/}	Total
<u>LAND TREATMENT - Going Program</u>						
Land Areas ^{3/}						
Cropland	Acres	1,119			43,200	43,200
Pasture	"	3,653			370,200	370,200
Range	"	3,538			42,200	42,200
Forest	"	2,124			7,200	7,200
Miscellaneous	"	466			2,600	2,600
Technical Assistance					31,600	31,600
Subtotal					497,000	497,000
<u>LAND TREATMENT - Accelerated</u>						
Land Areas ^{3/}						
Cropland	Acres	390			15,000	15,000
Pasture	"	1,274			129,100	129,100
Range	"	1,234			14,700	14,700
Forest	"	740			2,500	2,500
Miscellaneous	"	162			900	900
Critical Area Stabilization						
Tree Planting	"	40	6,400		1,600	8,000
Major Grade Stab. Struc.	No.	12	108,600		27,165	135,765
Minor Grade Stab. Struc.	"	274	328,800		82,200	411,000
Shaping and Sodding	Acres	564	67,680		16,920	84,600
Channel Lining ^{7/}	Ft.	153,300	1,226,400		306,600	1,533,000
Technical Assistance			110,650	550	-	111,200
Subtotal			1,848,530	550 ^{4/}	596,685	2,445,165
LAND TREATMENT			1,848,530	550	1,093,685	2,942,165
<u>STRUCTURAL MEASURES</u>						
<u>Construction</u>						
Floodwater Retarding Struc.	No.	10	848,500			848,500
Multipurpose Structure	"	1	283,200		227,800	511,000
Structure Inlet Tower	"	1	-		50,000	50,000
Recreation Facilities			137,700		137,700	275,400
Subtotal - Construction			1,269,400		415,500	1,684,900
Engineering Services			145,000		35,300	180,300
Relocation Payments			13,160		4,840	18,000
<u>Project Administration</u>						
Construction Inspection			311,200			311,200
Other			54,800		23,600	78,400
Relocation Assist. Adv. Serv.					1,300	1,300
Subtotal - Project Adm.			366,000		24,900	390,900
Other Costs - Land Rights ^{5/}			119,700		306,500	426,200
TOTAL STRUCTURAL MEASURES			1,913,260		787,040	2,700,300
TOTAL PROJECT COSTS ^{6/}			3,761,790	550	1,383,725	5,146,065
TOTAL ALL COSTS			3,761,790	550 ^{4/}	1,880,725	5,643,065

^{1/} Price base 1976.^{2/} Federal agency responsible for assisting in installation of works of improvement.^{3/} Includes only areas estimated to be adequately protected during the project installation period.

Treatment will be applied throughout the watershed and dollar amounts apply to total land areas, not just to adequately protected areas.

^{4/} Assistance under the Cooperative Forest Management Program.^{5/} Includes \$3,000 legal fees.^{6/} Excludes Going Program Land Treatment.^{7/} Concrete liners in the bottom of steep, short sections of eroding ditches and waterways within critical areas.

February 1978



TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT

ROBINSON CREEK WATERSHED
Lincoln County, Oklahoma

Measure	Unit	Number Applied to date	Total Cost (Dollars)
<u>LAND TREATMENT</u>			
Conservation Cropping System	Acre	2,973	44,595
Contour Farming	Acre	690	414
Crop Residue Use	Acre	2,973	2,973
Diversion	Feet	2,000	520
Terrace	Feet	6,000	720
Grassed Waterway	Acre	2	224
Pasture & Hayland Planting	Acre	5,042	201,680
Pasture & Hayland Management	Acre	4,240	4,240
Critical Area Planting	Acre	397	59,550
Range Seeding	Acre	1,081	32,430
Proper Grazing Use	Acre	20,391	20,391
Farm Pond	No.	142	85,200
Fishpond Management	No.	54	540
TOTAL LAND TREATMENT			453,477

Price base: 1976

February 1978

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION

Robinson Creek Watershed, Oklahoma

(Dollars) ^{1/}

Item	INSTALLATION COST (Dollars) 1/										Total Installation Cost
	P. L. 566 Funds					Other Funds					
	Construction	Engineering	Land Rights	Relocation Payments	Total P. L. 566	Construction	Engineering	Land Rights	Relocation Payments	Total Other	
Structural Measures											
Floodwater Retarding											
1	93,000	11,200	-	-	104,200	-	-	12,900	-	12,900	117,100
2	60,700	8,500	-	-	69,200	-	-	3,500	-	3,500	72,700
3	106,000	12,700	-	-	118,700	-	-	5,200	-	5,200	123,900
5	74,300	10,400	-	-	84,700	-	-	4,900	-	4,900	89,600
6	143,700	16,100	-	-	159,800	-	-	40,600	-	40,600	200,400
7	115,000	16,000	-	-	131,000	-	-	6,000	-	6,000	137,000
8	55,800	7,800	-	-	63,600	-	-	3,800	-	3,800	67,400
9	51,500	7,200	-	-	58,700	-	-	2,900	-	2,900	61,600
10	91,500	11,000	-	-	102,500	-	-	12,800	-	12,800	115,300
11	57,000	8,000	-	-	65,000	-	-	6,400	-	6,400	71,400
Sub-Total	848,500	108,900	-	-	957,400	-	-	99,000 2/	-	99,000	1,056,400
Multiple-Purpose St. 4-M	283,200	23,700	77,100	13,160	397,160	227,800	16,900	153,900	4,840	403,440	800,600
Recreation Facilities	137,700	12,400	42,600	-	192,700	137,700	12,400	53,600	-	203,700	396,400
Inlet Tower	-	-	-	-	-	50,000	6,000	-	-	56,000	56,000
Sub-Total	420,900	36,100	119,700	13,160	589,860	415,500	35,300	207,500 4/	4,840	663,140	1,253,000
Project Administration	-	-	-	-	366,000	-	-	-	-	24,900 3/	390,900
TOTAL	1,269,400	145,000	119,700	13,160	1,913,260	415,500	35,300	306,500	4,840	787,040	2,700,300

^{1/} Price Base 1976.^{2/} Includes \$1,000 legal fees and \$26,000 for modification of improvements.^{3/} Includes \$1,300 for Relocation Assistance Advisory Services.^{4/} Includes \$2,000 legal fees, \$10,000 for modification of improvements, and \$2,000 for flowage easements.

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TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY

Robinson Creek Watershed, Oklahoma
(Dollars) ^{1/}

	COST ALLOCATION				COST SHARING							
	Purpose				P. L. 566							
	Flood Prevention	Municipal	Recreation	Total	Flood Prevention	Municipal	Recreation	Total	Flood Prevention	Municipal	Recreation	Total
10 Single Purpose Floodwater Retarding Struc.	1,056,400	-	-	1,056,400	957,400	-	-	957,400	99,000	-	-	99,000
1 Multipurpose Structure												
Construction	267,700	212,300	31,000	511,000	267,700	-	15,500	283,200	-	212,300	15,500	227,800
Engineering	21,300	16,900	2,400	40,600	21,300	-	2,400	23,700	-	16,900	-	16,900
Land Rights	2,000 ^{2/}	74,800 ^{3/}	154,200	231,000	-	-	77,100	77,100	2,000 ^{2/}	74,800 ^{3/}	77,100	153,900
Relocation Payments	9,430	7,480	1,090	18,000	6,890	5,470	800	13,160	2,535	2,010	295	4,840
Recreation Facilities												
Construction	-	-	275,400	275,400	-	-	137,700	137,700	-	-	137,700	137,700
Engineering	-	-	24,800	24,800	-	-	12,400	12,400	-	-	12,400	12,400
Land Rights	-	-	96,200 ^{4/}	96,200	-	-	42,600	42,600	-	-	53,600 ^{4/}	53,600
Inlet Tower												
Construction	-	50,000	-	50,000	-	-	-	-	-	50,000	-	50,000
Engineering	-	6,000	-	6,000	-	-	-	-	-	6,000	-	6,000
Total	1,356,830	367,480	585,090	2,309,400	1,253,290	5,470	288,500	1,547,260	103,535	362,010	296,595	762,140

^{1/} Price base 1976.^{2/} Flowage easements.^{3/} Includes \$1,000 legal fees.^{4/} Includes \$1,000 legal fees and \$10,000 for movement of utilities and roads.

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TABLE 2B - RECREATION FACILITIES AT SITE 4-M
Robinson Creek Watershed, Oklahoma
(Dollars) ^{1/}

Item	Quantity ^{2/}	Unit	Estimated Unit Price	Total Construction Cost
Trails	4.5	Mile	2,100	9,450
Roads - 6" gravel base, 20' roadbed	2.25	Mile	22,440	50,500
Road Drainage Structures	10	Ea.	1,750	17,500
Parking Lots - 170 spaces (40 - 10' x 40' 130 - 10' x 20')	1	Acre	8,900	8,900
Boat Ramp (20' x 50')	1	Ea.	2,500	2,500
Boat Dock (10' x 100')	1	Ea.	7,500	7,500
Fishing Dock(10' x 100', covered)	1	Ea.	39,400	39,400
Picnic Shelter(20' x 40', con- crete floor	1	Ea.	10,000	10,000
Cooking Grills	10	Ea.	150	1,500
Picnic Tables (3' x 6')	20	Ea.	150	3,000
Fencing	6.7	Mile	2,500	16,750
Camp Sites	15	Ea.	800	12,000
Landscaping and Vegetation	60	Acre	200	12,000
Water System	1	Ea.	2,500	2,500
Electrical System	1	Ea.	6,000	6,000
Comfort Stations, Septic Tanks (4 unit, 2 seats each sex, with dressing rooms and shelves)	2	Ea.	20,000	40,000
				<u>\$239,500</u>
Contingency 15 percent				<u>35,900</u>
				<u>\$275,400</u>

^{1/} Price base: 1976

^{2/} Estimated quantity, subject to minor variation at time
of detail planning.

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TABLE 3 - STRUCTURAL DATA
Robinson Creek Watershed, Oklahoma

Item	Unit	Structure Number					
		1	2	3	4M	5	6
Class of Structure		a	a	a	b	a	a
Drainage Area	Sq.Mi.	2.18	1.09	1.54	6.65	1.59	7.52
Curve No. (1 day) (AMC II)		75	75	75	75	75	75
Tc	Hr.	1.37	0.89	0.90	2.13	1.20	1.88
Elevation Top of Dam ^{1/}	Ft.	837.7	859.2	876.4	878.7	864.1	900.1
Elevation Crest Emergency Spillway ^{1/}	Ft.	834.7	856.2	873.4	874.7	861.1	896.1
Principal Spillway Crest Elevation (50-year)	Ft.	823.8	846.8	862.4	868.0 ^{3/}	849.3	883.9
Maximum Height of Dam ^{1/}	Ft.	29	37	31	49	26	40
Volume of Fill ^{1/}	Cu.Yd.	74,100	44,600	82,700	183,300	65,900	109,400
Total Capacity ^{1/}	Ac.Ft.	644	309	466	4,097	434	2,458
Sediment Submerged 1st 50-yrs	Ac.Ft.	93	51	78	234 ^{4/}	56	361
Sediment Submerged 2nd 50-yrs	Ac.Ft.	87	47	73	-	54	345
Recreation Sediment	Ac.Ft.	-	-	-	71	-	-
Municipal Sediment	Ac.Ft.	-	-	-	92	-	-
Aerated Sediment	Ac.Ft.	33	17	26	67	19	124
Recreation	Ac.Ft.	-	-	-	248	-	-
Municipal	Ac.Ft.	-	-	-	1,703	-	-
Floodwater Detention	Ac.Ft.	431	194	289	1,682	305	1,628
Surface Area ^{1/}							
Sediment Pool (50-year)	Acre	23	14	18	60 ^{4/}	15	74
Recreation Pool	Acre	-	-	-	102	-	-
Municipal Pool	Acre	-	-	-	225	-	-
Retarding Pool	Acre	41	39	64	312	54	247
Principal Spillway Design							
Rainfall Volume (1 day)	In.	7.05	7.05	7.05	7.90	7.05	7.48
Rainfall Volume (10 day)	In.	11.60	11.60	11.60	13.00	11.60	12.33
Runoff Volume (10 day)	In.	5.92	5.92	5.92	7.10	5.92	6.53
Capacity of Principal Spillway (Max.) ^{1/}	CFS	31	29	31	120	29	109
Dimension of Conduit	In.	18	18	18	30	18	30
Emergency Spillway Design							
Frequency Operation - Emergency Spillway	% Chance	4	4	4	2	4	2.8
Rainfall Volume (ESH)	In.	6.45	6.45	6.45	9.30	6.45	7.88
Runoff Volume (ESH)	In.	3.67	3.67	3.67	6.22	3.67	4.93
Storm Duration	Hr.	6	6	6	6	6	6
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	50	50	50	215	50	200
Velocity of Flow (Ve) ^{2/}	FPS	4.97	2.28	4.98	4.16	5.01	3.97
Slope of Exit Channel ^{2/}	%	2.93	4.51	2.93	3.02	2.93	3.12
Maximum Water Surface Elevation	Ft.	-	856.4	-	875.7	-	897.0
Freeboard Design							
Rainfall Volume (FH)	In.	9.30	9.30	9.30	15.60	9.30	12.45
Runoff Volume (FH)	In.	6.22	6.22	6.22	12.21	6.22	9.19
Storm Duration	Hr.	6	6	6	6	6	6
Maximum Water Surface Elevation	Ft.	836.9	858.4	875.8	878.7	863.4	900.1
Capacity Equivalents							
Sediment Volume	In.	1.55	1.68	1.84	.66	1.30	1.76
Sediment in Recreation Pool	In.	-	-	-	.20	-	-
Sediment in Municipal Pool	In.	-	-	-	.26	-	-
Sediment in Detention Pool	In.	.28	.29	.31	.19	.22	.31
Recreation Volume	In.	-	-	-	.70	-	-
Municipal Volume	In.	-	-	-	4.80	-	-
Detention Volume	In.	3.71	3.34	3.52	4.74	3.60	4.06

^{1/} May require slight adjustment in final design.

^{2/} Sites with no emergency spillway flow based on 25 percent of freeboard flow.

^{3/} Top of Municipal pool.

^{4/} 100-year sediment pool.

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TABLE 3 - STRUCTURAL DATA (Cont'd)

Robinson Creek Watershed, Oklahoma

Item	Unit	Structure Number					Total
		7	8	9	10	11	
Class of Structure		a	a	a	a	a	
Drainage Area	Sq.Mi.	2.45	1.05	.73	2.62	1.90	29.32
Curve No. (1 day) (AMC II)		73	73	73	73	73	
Tc	Hr.	1.33	1.26	0.88	1.64	1.14	
Elevation Top of Dam <u>1/</u>	Ft.	899.7	887.2	879.7	848.8	833.3	
Elevation Crest Emergency Spillway <u>1/</u>	Ft.	896.7	884.2	876.7	845.8	830.3	
Principal Spillway Crest Elevation (50-year)	Ft.	885.1	873.9	867.4	832.5	819.3	
Maximum Height of Dam <u>1/</u>	Ft.	39	23	21	30	26	
Volume of Fill <u>1/</u>	Cu.Yd.	90,600	55,500	26,200	70,800	43,500	846,600
Total Capacity <u>1/</u>	Ac.Ft.	662	282	186	655	547	10,740
Sediment Submerged 1st 50-years	Ac.Ft.	108	46	27	87	86	1,227
Sediment Submerged 2nd 50-years	Ac.Ft.	106	44	27	83	81	947
Recreation Sediment	Ac.Ft.	-	-	-	-	-	71
Municipal Sediment	Ac.Ft.	-	-	-	-	-	92
Aerated Sediment	Ac.Ft.	37	15	11	28	30	407
Recreation	Ac.Ft.	-	-	-	-	-	248
Municipal	Ac.Ft.	-	-	-	-	-	1,703
Floodwater Detention	Ac.Ft.	411	177	121	457	350	6,045
Surface Area <u>1/</u>							
Sediment Pool (50-year)	Acre	22	10	8	20	21	285
Recreation Pool	Acre	-	-	-	-	-	102
Municipal Pool	Acre	-	-	-	-	-	225
Retarding Pool	Acre	75	35	30	71	69	1,037
Principal Spillway Design							
Rainfall Volume (1 day)	In.	7.05	7.05	7.05	7.05	7.05	
Rainfall Volume (10 day)	In.	11.60	11.60	11.60	11.60	11.60	
Runoff Volume (10 day)	In.	5.62	5.62	5.62	5.62	5.62	
Capacity of Principal Spillway (Max.) <u>1/</u>	CFS	65	27	28	59	28	
Dimension of Conduit	In.	24	18	18	24	18	
Emergency Spillway Design							
Frequency Operation - Emergency Spillway	% Chance	4	4	4	4	4	
Rainfall Volume (ESH)	In.	6.45	6.45	6.45	6.45	6.45	
Runoff Volume (ESH)	In.	3.47	3.47	3.47	3.47	3.47	
Storm Duration	Hr.	6	6	6	6	6	
Type	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	
Bottom Width	Ft.	80	50	50	90	50	
Velocity of Flow (Ve) <u>2/</u>	FPS	5.23	1.83	1.74	5.17	4.86	
Slope of Exit Channel <u>2/</u>	%	2.84	5.21	5.42	2.86	2.97	
Maximum Water Surface Elevation	Ft.	-	884.3	876.8	-	-	
Freeboard Design							
Rainfall Volume (FH)	In.	9.30	9.30	9.30	9.30	9.30	
Runoff Volume (FH)	In.	5.98	5.98	5.98	5.98	5.98	
Storm Duration	Hr.	6	6	6	6	6	
Maximum Water Surface Elevation	Ft.	899.2	886.4	878.4	848.3	832.5	
Capacity Equivalents							
Sediment Volume	In.	1.64	1.63	1.38	1.22	1.65	
Sediment in Recreation Pool	In.	-	-	-	-	-	
Sediment in Municipal Pool	In.	-	-	-	-	-	
Sediment in Detention Pool	In.	.28	.28	.28	.20	.29	
Recreation Volume	In.	-	-	-	-	-	
Municipal Volume	In.	-	-	-	-	-	
Detention Volume	In.	3.15	3.22	3.12	3.27	3.46	

1/ May require slight adjustment in final design.2/ Sites with no emergency spillway flow based on 25 percent of freeboard flow.3/ Top of municipal pool.4/ 100-year sediment pool.

February 1978

TABLE 4 - ANNUAL COST

Robinson Creek Watershed, Oklahoma
(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost <u>2/</u>	Operation and Maintenance Cost	Total
10 Single-purpose structures and 1 multi-purpose structure and recreational facilities	147,520	34,110 <u>3/</u>	181,630
Project Administration	24,970		24,970
GRAND TOTAL	172,490	34,110	206,600

1/ Price Base: 1976.

2/ Amortized at 6.325 percent interest rate for 100 years.

3/ Includes \$22,200 for operation, maintenance, and replacement for the recreational development, and \$2,010 for maintenance of wildlife mitigation measures.

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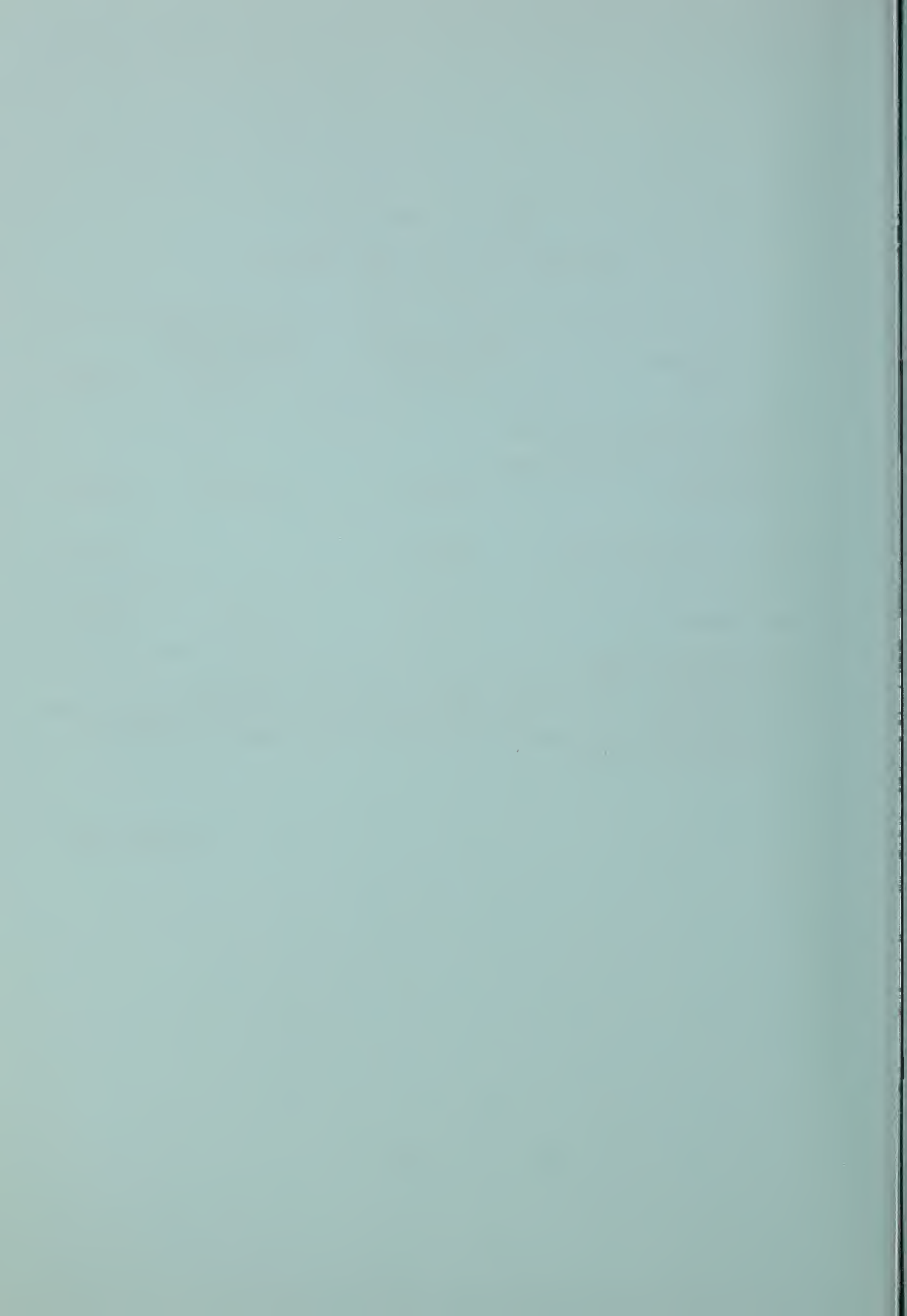


TABLE 5 - ESTIMATED AVERAGE ANNUAL
FLOOD DAMAGE REDUCTION BENEFITS

Robinson Creek Watershed, Oklahoma

(Dollars) ^{1/}

Item	Estimated Average Annual Damage ^{2/}		Damage Reduction Benefit ^{2/}
	Without Project	With Project	
Floodwater			
Crop and Pasture	51,300	25,000	26,300 ^{3/}
Other Agricultural	3,300	1,500	1,800
Nonagricultural			
Road & Bridge	8,100	3,300	4,800
Petroleum & Industrial	12,800	5,200	7,600
Subtotal	75,500	35,000	40,500
Sediment			
Overbank Deposition	34,300	20,200	14,100
Reservoirs	3,500	1,900	1,600
Subtotal	37,800	22,100	15,700
Erosion			
Floodplain Scour	8,000	3,100	4,900
Indirect	24,500	4,000	20,500
TOTAL	145,800	64,200	81,600

^{1/} Price Base: Current normalized prices (7/76) for crop and pasture values. 1976 prices for other values.

^{2/} Excludes benefits of Accelerated Land Treatment Measures.

^{3/} Includes \$5,700 benefits to Deep Fork River floodplain.

February 1978



TABLE 6 - COMPARISON OF BENEFITS AND COSTS

Robinson Creek Watershed, Oklahoma
(Dollars)

Evaluation Unit	Damage Reduction ^{2/}	AVERAGE ANNUAL BENEFITS ^{1/}			Employment	Total	Average Annual Cost ^{3/}	Benefit Cost Ratio
		More Intensive Land Use	Municipal Water Supply	Recreation				
10 Single-purpose structures and 1 Multipurpose Structure and Recreation Facilities	81,600	45,800	38,000	75,700	14,500	255,600	181,630	1.4:1
Project Administration							24,970	
TOTAL	81,600	45,800	38,000	75,700	14,500	255,600	206,600	1.2:1

^{1/} Price Base: Current normalized (7/76) for agricultural prices and costs. Municipal water supply based on current average cost of raw water. Employment benefits derived from 1976 construction costs. Recreation benefits determined from recreational values per recreation day published in USDA Procedures for Planning Water and Related Land Resources, March 1974.

^{2/} From Table 5.

^{3/} From Table 4.

February 1978

TABLE 7 - WILDLIFE MITIGATION

Robinson Creek Watershed, Oklahoma

Site Number	Vegetative Plantings		Fencing		Total
	Acres to be Installed	Cost (Dollars)	Miles	Cost (Dollars)	
1	3	600	0.5	2,500	3,100
3	3	600	0.5	2,500	3,100
4-M	52	10,400	-	-	10,400
6	8	1,600	1.0	5,000	6,600
7	3	600	0.5	2,500	3,100
9	3	600	0.5	2,500	3,100
10	2	400	0.4	2,000	2,400
11	1	200	0.2	1,000	1,200
NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of NE $\frac{1}{4}$ 26-13-5	10	2,000	1.0	5,000	7,000
SW $\frac{1}{4}$ 36-13-5	10	2,000	1.0	5,000	7,000
Total	95	19,000	8.1	28,000	47,000

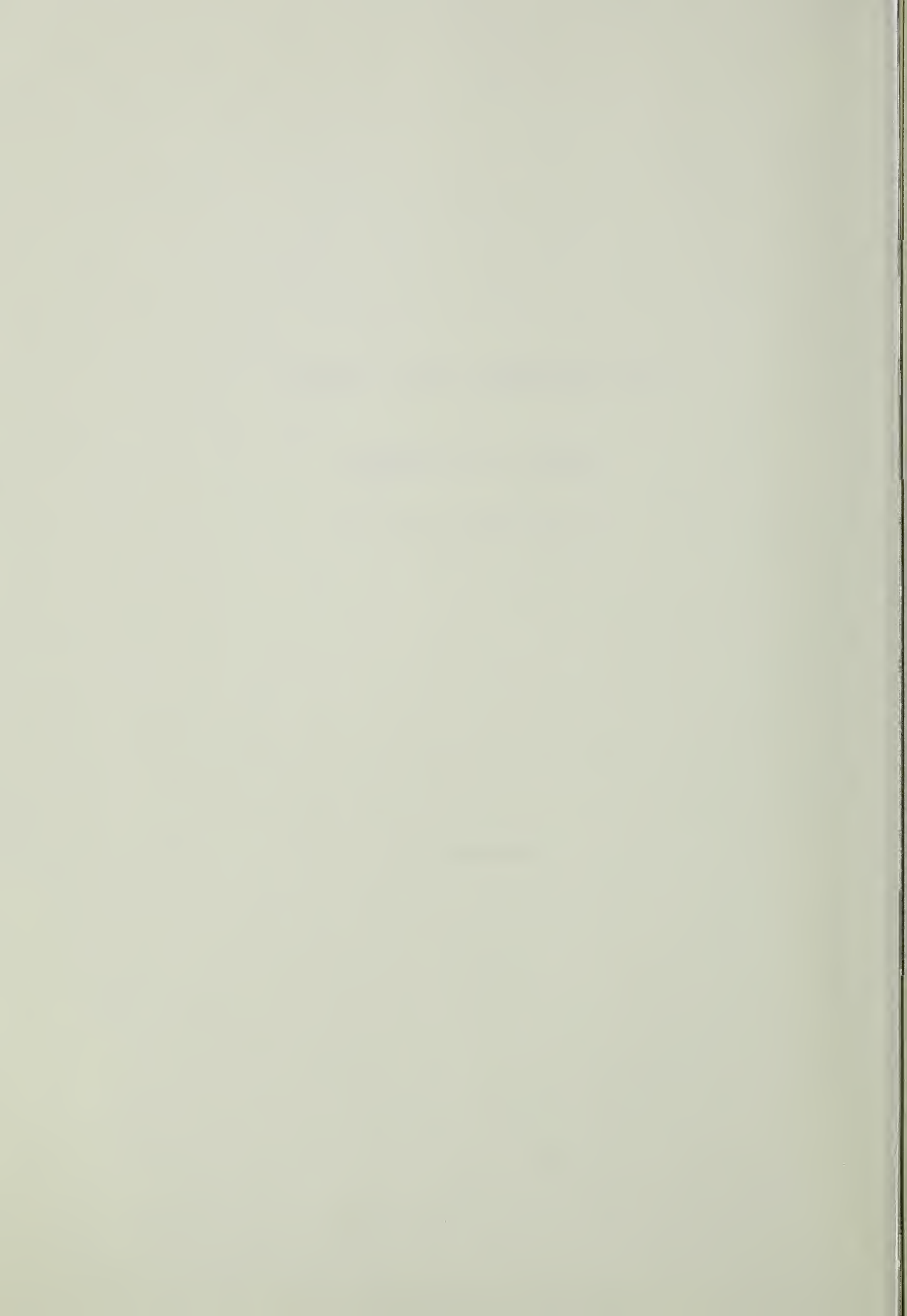
February 1978

FINAL ENVIRONMENTAL IMPACT STATEMENT

ROBINSON CREEK WATERSHED

Lincoln County, Oklahoma

FEBRUARY 1978



USDA-SCS-EIS-WD-(ADM)-78-1-F-OK

ROBINSON CREEK WATERSHED PROJECT
Lincoln County, Oklahoma

ENVIRONMENTAL IMPACT STATEMENT

Roland R. Willis
State Conservationist
Soil Conservation Service

Sponsoring Local Organizations

Lincoln County Conservation District
P. O. Box 307, Chandler, Oklahoma 74834

City of Prague
Prague, Oklahoma 74864

Lincoln County Commission
Courthouse, Chandler, Oklahoma 74834

February 1978

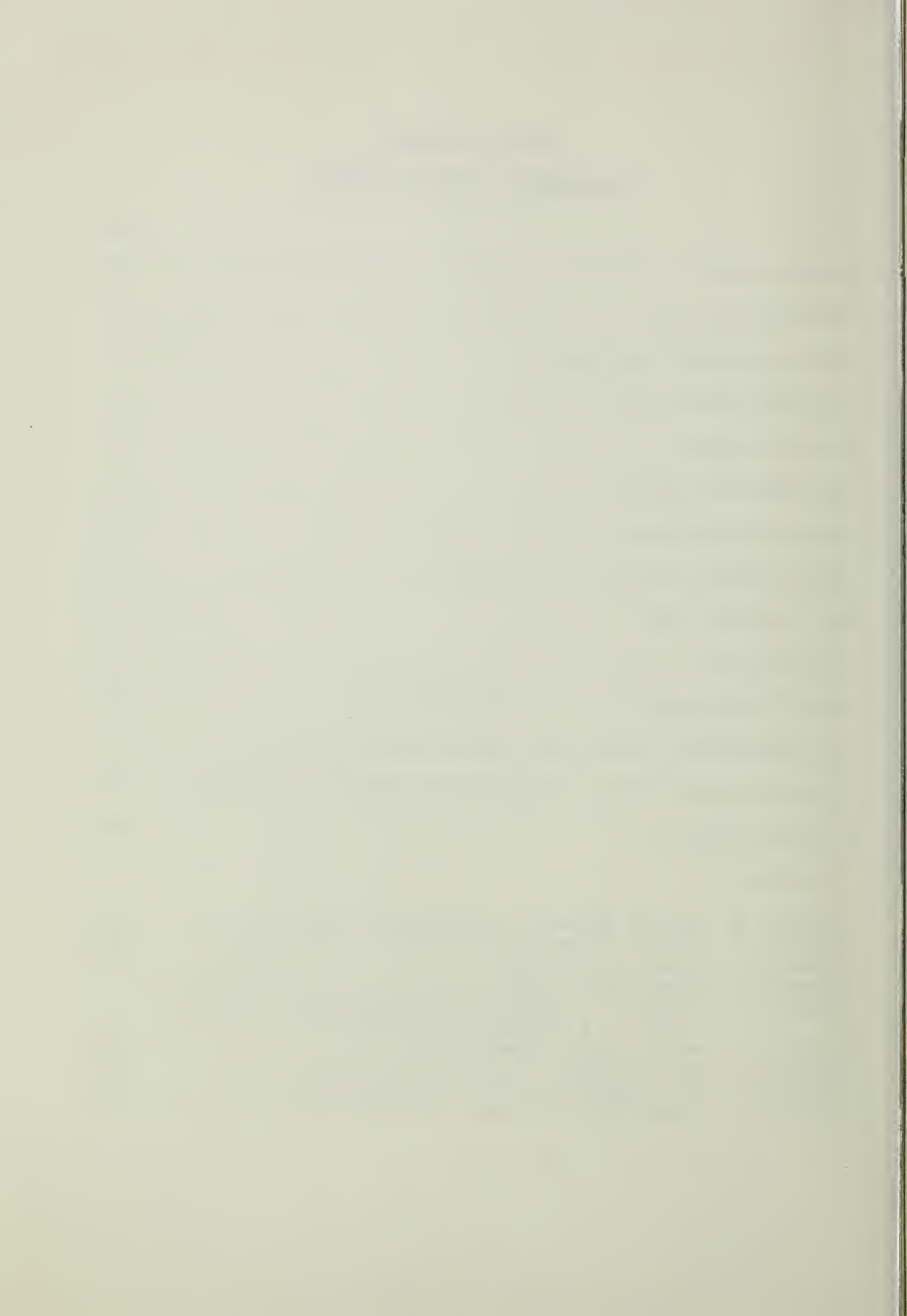
Prepared By

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
USDA Building
Farm Road and Brumley Street
Stillwater, Oklahoma 74074



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USDA ENVIRONMENTAL IMPACT STATEMENT

ROBINSON CREEK WATERSHED PROJECT Lincoln County, Oklahoma

Prepared in accordance with
Sec. 102 (2) (C) of P.L. 91-190

SUMMARY

- I. Final
- II. Soil Conservation Service
- III. Administrative
- IV. Description of Project Purpose and Action:

The Robinson Creek Plan proposes a project for watershed protection, flood prevention, municipal water supply, and recreation to be implemented under the authority of the Watershed Protection and Flood Prevention Act (P.L. 566, 83rd Congress, 68 Stat. 666), as amended. The planned works of improvement include conservation land treatment supplemented by 10 floodwater retarding structures and one multipurpose structure designed to retard flood flows, provide a municipal water supply, and provide a recreation water supply with attendant recreational facilities.

- V. Summary of Impacts:

Upland erosion, runoff, and flooding will be reduced, as will associated agricultural and non-agricultural damages. The project will directly benefit about 85 landowners and operators, and about 22,000 other persons in the surrounding area. Stream base flows will be stabilized, total sediment yield from the watershed will be reduced, and water quality below the structures will be improved. The appearance of the countryside will be improved, a new recreational facility will be added to the watershed, and a needed source of municipal water will be provided for the City of Prague. Crop yields and pasture feed values will be increased, family farming operations stabilized, and net returns increased for low income farmers. Lives will be protected and employment opportunities will be created. Archeological knowledge will be expanded and sites investigated or salvaged that would otherwise go unrecognized or be lost to ongoing destructive processes. Wildlife populations will become more stable in the floodplain due to fewer drownings of young and destruction of den areas by floodwaters and sediment. Wildlife food supplies will also be improved in the

floodplain due to reduced sediment deposition and flooding. However, woodland habitat acres in the floodplain will be reduced due to intensification of agricultural production. Woodland wildlife habitat and the populations of woodland species will decrease in the uplands due to the destruction of woodland habitat in the site areas. Openland wildlife habitat will also decrease in the uplands due to the permanent water in the site areas. However, other project land use changes will result in few, if any, adverse impacts on openland wildlife. Populations of water oriented species including migratory waterfowl are expected to increase due to the presence of 450 acres of new habitat in 11 small lakes distributed throughout the watershed. About 450 acres of land devoted to sediment pools, dams, and spillways will be removed from agricultural production. Of this amount, about 86 acres are in cropland, 125 acres are pasture, 82 acres are range, and 157 acres are forest. These areas will be lost from agricultural production for the life of the project. Agricultural production on the 587 acres involved in the detention pool area of the structures will also be restricted during periods of high water. This restriction will exist for the life of the project. There will be an increase in noise, dust, erosion, and turbidity of stream during the construction process. About 14,700 acres of land that has not previously been treated will receive conservation land treatment during the project period. Three farming operations, including one family, will be displaced in the vicinity of the multipurpose site.

VI. List of Alternatives:

Alternative 1 - accelerated land treatment only.

Alternative 2 - accelerated land treatment and 11 floodwater retarding structures. This is the NED and the EQ plan as well as the selected plan.

Alternative 3 - accelerated land treatment and channel work.

Alternative 4 - the nonstructural plan is accelerated land treatment and floodplain purchase.

Alternative 5 - No project.

VII. Agencies and organizations from which written comments were requested include:

- Department of the Army
- Department of Commerce
- Department of Health, Education, and Welfare
- Department of the Interior
- Department of Transportation

Environmental Protection Agency
Office of Equal Opportunity, USDA
Federal Power Commission
Oklahoma Historic Preservation Officer
Governor of Oklahoma
State Clearinghouse
Regional Clearinghouse
Natural Resources Defense Council
Friends of the Earth
Environmental Defense Fund
National Wildlife Federation
National Audubon Society
Environmental Impact Assessment Project
Isaac Walton League, Oklahoma Chapter
Sierra Club, Oklahoma Chapter
Oklahoma Wildlife Federation
Tulsa Audubon Society

USDA SOIL CONSERVATION SERVICE
FINAL ENVIRONMENTAL IMPACT STATEMENT 1/

for

ROBINSON CREEK WATERSHED, OKLAHOMA

AUTHORITY

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83rd Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

Lincoln County Conservation District

City of Prague

Lincoln County Commission

PROJECT PURPOSES AND GOALS

The principal purposes of this plan are watershed protection and flood prevention. Municipal water supply and recreation purposes were added as supplements to the principal purposes. Included are design elements to safeguard fish and wildlife habitat and measures to mitigate, to the extent possible, unavoidable fish and wildlife losses.

Sponsors initially described their problems as erosion, sedimentation, flooding, drainage, and irrigation. Through investigation of resource conditions, evaluations and discussions, erosion, sedimentation, and flooding problems were found to be serious and widespread. Although drainage and irrigation problems and needs are real, possible solutions were not satisfactory to all publics due to the physical, economic, and environmental limitations. Drainage and irrigation were thus dropped from further consideration. Through the evaluation and review process, municipal water supply and additional waterbased recreation opportunities were found to be needed and were added to the list of purposes.

During the resource inventories, special studies and evaluations showed that sediment transported by flooding limited the diversity of species in the lower reaches of watershed streams.

Flooding and attendant sedimentation and scour also was determined to have a detrimental effect on terrestrial wildlife and their habitat in the floodplain.

1/ All information and data, except as otherwise noted, were collected during watershed planning investigation by the SCS, and FS, USDA.

Goals are to: reduce erosion; reduce floodwater, sediment, and scour damages on the main floodplain areas; provide water to meet the City of Prague's demand to the year 2005; provide water based recreation opportunities; and minimize damages to archeological and historical, fish and wildlife, and similar environmental resources.

Land treatment measures were evaluated for their impacts on the watershed. Following this evaluation, critical area treatment with PL-566 funded technical and financial assistance, was added to the land treatment portion of the project. It was decided that critical area treatment was required to provide the desired reductions in erosion and sediment, and to improve the water quality, fish and wildlife habitat, and the visual quality of the watershed.

Structural measures (floodwater retarding structures, the multipurpose structure, and recreation facilities) were examined in various combinations for their effectiveness and impacts on objectives. Through this process, the design of the individual structures was modified to reduce damages to environmental factors where possible and to include wildlife mitigation agreed to by sponsors where damage to the environment was unavoidable.

Through further analysis it was determined that a single plan would satisfy both the economic and environmental objectives. Several other plans with varying levels of contributions to the economic and environmental objectives were also formulated. Through review of these plans, their effectiveness, costs, monetary benefits, impacts, and other factors, the selected plan was finally identified. The purposes and goals of the sponsors and SCS, modified throughout the planning process, are expressed in terms of national economic development and environmental quality in the alternatives section.

PLANNED PROJECT

This plan includes land treatment and structural measures. Land treatment practices include those normally installed by the landowners and operators using available technical and financial assistance, and critical area treatment which requires additional financial assistance. Technical assistance is for gathering of resources information, conservation plan revision or preparation, and for measure installation. Structural measures include 10 floodwater retarding structures, one multipurpose (floodwater retarding-municipal water supply-recreation) structure with appurtenances, and fish and wildlife mitigation measures. Recreation facilities are planned at the multipurpose structure.

LAND TREATMENT

Adequate protection of land is achieved through proper management which includes installation of a system of conservation practices designed for the climate, soil, and land use. Alternative combinations or systems of conservation practices described in SCS technical guides are designed to fit the physical limitations of the soil for several land uses and management levels. Typical conservation practices include conservation cropping systems, crop residue use, contour farming, diversions, terraces, grassed waterways, pasture and hayland planting, pasture and hayland management, range seeding, proper grazing use, brush management, wetland development, land protection during development, tree plantings, and critical area treatment. Critical areas include gullied and badly eroded areas located on farms and ranches and along county roads. Treatment includes shaping and filling of gullies, installation of simple grade stabilization structures (usually pipes with appurtenances), concrete chutes and channel liners (concrete liner in the bottom of steep short sections of eroding ditches and waterways within critical areas), diversion terraces, shaped waterways, and vegetation (sod, planting of grass, shrubs, and trees), fertilization and protective fencing.

Technical assistance is provided for soil surveys and other resource inventories needed to identify specific land treatment needs; for development of new conservation plans on individual units of watershed land; and for revision and updating of old conservation plans. The land treatment measures are installed by the individual landowners or operators. Although some form of federal cost sharing is normally available for installation of some of the more costly land treatment measures, the demand for these funds invariably exceeds the available amount. As a result, individual farmers provide the major portion of the costs for most land treatment measures. All of these measures are applied on a strictly voluntary basis. Technical assistance to aid in installation, application, or maintenance of these measures is provided by various federal agencies, including the Soil Conservation Service, the Agricultural Stabilization and Conservation Service, and the U. S.

Forest Service through their going program with the State Forestry Division. Each conservation plan will include the conservation practices agreed to by the landowners, the district, and the SCS.

Technical assistance may be provided to assist landowners and operators in applying conservation practices to any acres in the watershed. At the present time, about 30,000 acres in the watershed are inadequately treated. These acres include about 3,200 acres of cropland, 8,900 acres of pasture, 8,800 acres of range, 8,400 acres of forest, and 700 acres of miscellaneous uses. During the project period, about 1,510 acres of cropland, 4,930 acres of pasture, 4,770 acres of range, 2,860 acres of forest, and 630 miscellaneous acres will receive sufficient conservation treatment to become adequately protected. These acreages include 452 acres of critical areas interspersed within farm and ranch land and about 152 acres along 93 miles of roadside. The acres to be adequately protected reflects normal and recurring changes in land use.

In developing conservation plans, the district, the SCS, the Oklahoma Forestry Division, and the affected landowners will discuss the treatment area, costs, effectiveness, and cost-sharing assistance. Through this process each landowner or operator will be encouraged to install land treatment for adequate protection of his land. Fish and wildlife measures will be a part of the conservation practices considered and their installation, operation, and maintenance will be encouraged.

An installation schedule will be developed by the landowner, the district, the SCS, and the Oklahoma Forestry Division. The SCS and the Oklahoma Forestry Division in cooperation with the U. S. Forest Service will provide technical assistance for installation. The landowner or operator will use cost-sharing assistance available through the ASCS program. PL-566 funds will be used to cost-share in critical area treatment. Cost sharing with PL-566 funds will be limited to rates authorized under other programs.

STRUCTURAL MEASURES

The works of improvement to be installed in this project will consist of 10 single-purpose floodwater retarding structures, one multipurpose structure which will provide capacity for floodwater detention, municipal water, and recreation water storage with attendant facilities. About 95 acres of wildlife mitigation measures will also be established.

The floodwater retarding structure and the multipurpose structure are reservoir type impoundments. They are designed to remain totally effective for 100 years and partially effective for an additional period of years.

Common components consist of an earth-fill dam, a reinforced concrete principal spillway, and a vegetated emergency spillway in an earth cut.

Reservoir Type Structures

The structures will range in height from 21 to 49 feet, with earth fill volumes ranging from 24,200 to 183,300 cubic yards. The earth fills will be trapezoidal in cross section with a berm or riprap on the front slope for protection from wave action. Both front and back slopes of the dams will normally be 2.5:1.0.

The geologic formations underlying the watershed are composed of sandstone and shale members on which have developed soil of low to medium plasticity. Soil textures include sandy and silty clays, low plastic silts, and clayey and silty sands. These materials, in different combinations, will make up the fill materials of the dams. Structure foundations will involve soils ranging from shallow on the abutments to deep in the floodplain.

The minimum area on which land rights will be acquired for the structural measures is 1,290 acres. This includes 522 acres to be acquired in fee title at the multipurpose site for the structure, recreation facilities, and 52 acres of wildlife mitigation measures. Easements will be acquired for 725 acres for the single-purpose sites and for 43 acres for wildlife mitigation measures.

About 225 acres of the 725 acres involved in the single-purpose sites will be occupied by water when the 50-year sediment pools are full. An additional 30 acres will be involved in dams and spillways, and about 470 acres will be involved in the detention pools.

About 225 acres of the multipurpose structure will be occupied by water when the recreation and municipal pools are full. The remaining areas will be used for dam and spillway (5 acres), floodwater detention storage (82 acres), recreation (158 acres), and for wildlife mitigation measures (52 acres).

The total area in sediment and municipal water will be 450 acres. Dams and spillways will occupy about 35 acres, the detention pools will occupy about 552 acres, 158 acres will be involved in recreational areas, and 95 acres will be devoted to wildlife habitat mitigation measures.

Of the 485 acres involved in the dams, spillways, and permanent pools, 98 acres are bottomland timber and 59 acres are upland timber. However, timber clearing will occur only in those areas required to provide borrow material and for dam and spillway locations. The remaining trees will be left in the sediment and municipal pools to improve the fish habitat.

The principal spillways are made up of a drop inlet riser on the impoundment side of the dam, an outlet conduit under the dam, and an energy dissipator at the outlet of the conduit. The energy dissipator may be a plunge pool or an impact basin. The riser will be equipped with a trash guard and a valve for complete drainage of the reservoir.

The multipurpose structure will be equipped with a municipal water supply tower, outlet conduit, and control valve for diversion of the municipal water supply. This installation will be separate and apart from the principal spillway installed using PL-566 funds.

Principal spillway conduits are to be reinforced concrete pipe. The minimum diameter to be used will be 18 inches. The emergency spillways will be formed by a trapezoidal cut around one end of the dam. They will normally be established to vegetation to prevent erosion.

The design life of each of the 11 structures is 100 years. They are each designed with capacity for sediment (2,744 acre-feet total) and for floodwater detention (6,045 acre-feet total). Sediment capacity is based on the expected accumulation in 100 years from the drainage area above the individual structures (total area controlled is 29.32 square miles). Floodwater detention capacity is based on routings of runoffs from selected rainfall events through each structure. The multipurpose site will provide 248 acre-feet of capacity for recreation water and 1,703 acre-feet capacity provided for sediment storage and floodwater detention.

Water may be stored in the space provided for the 50-year sediment accumulation in the 10 floodwater retarding structures until displaced by the sediment accumulation, or the landowner may elect not to store water in the site. Where initial storage of water will result in an unsatisfactory impoundment from an environmental standpoint, the crest of the principal spillway may be raised to the level required for a satisfactory impoundment. However, this elevation is limited to the elevation of the expected 100-year sediment accumulation.

Where water is to be stored above the expected 50-year sediment level, a water right must be obtained by the landowner or operator. 1/

The crest of the principal spillway will normally be set at the estimated elevation of sediment accumulation at the end of 50 years. The discharge rate of the principal spillway and the floodwater detention capacity in each structure is designed to temporarily detain and to

1/ Oklahoma Water Resources Board Resolution adopted 1/10/61 governs principal spillway riser elevations, minimum discharge pipe capacity, and water rights in floodwater retarding structures.

automatically release runoff from the principal spillway design storm rainfall within a 10-day period while maintaining the water level at or below the crest of the emergency spillway. The discharge rate of the principal spillway and the detention storage volume of each structure is designed to limit use of the emergency spillway in accordance with the hazards presented by each site. There is a two percent chance that the emergency spillway of the multipurpose site will operate in any given year. The chance that the emergency spillways of the 10 other structures will function in any given year ranges from 2.8 percent to 4.0 percent. The vegetated earth spillway at each site is designed to safely pass the discharge from the emergency spillway design storm rainfall and will carry the discharge from the freeboard storm with the water level below the top of the dam.

Preliminary geologic investigations at structure site locations did not reveal any condition which would significantly affect the safety of any structure or result in excessive construction costs. Adequate suitable borrow material is available for construction of the earth fills.

Modification of roads, bridges, and utilities involved in the watershed include: pipelines in structures 1, 5, and 7, road and bridge in structures 6, 10, and 4-M. Disturbed areas will be established to vegetation for erosion control. Selected plantings of legumes, grasses, shrubs, and trees will be made in small plots totalling about 95 acres to mitigate wildlife habitat losses. These areas will be fenced for protection where needed.

The SCS will provide technical assistance for development of erosion control plans including the plantings to mitigate wildlife habitat losses. The U.S. Fish and Wildlife Service may, at their election, assist in the design of the habitat plantings.

There will be a total of 3 displacements due to the project. All of these will be in the vicinity of the multipurpose site. It is estimated that one family will be displaced from their home and three farm operations will be displaced. No known minority or low income persons are included in the displaced persons.

Public access to the single-purpose site areas is not provided for in this plan. Owners of the land on which the sites are located may allow public access on an individual basis, however, neither the SCS nor the local sponsors will require it. Where public access is allowed, the landowner or operator will be responsible for providing adequate sanitary facilities as required by law.

Each construction contract will require the contractor to adhere to applicable provisions of the Clean Air and Federal Water Pollution Control Acts to minimize noise, air, and water pollution.

Occupational noise exposure will be kept to safe levels by the use of suppressant devices or through use of personal protection equipment. Standard sound level meters will be used to monitor construction activities, assuring that neither workers nor inspectors will be exposed to harmful noise levels beyond that specified by the Labor Department Standards.

Air, erosion and water pollution will be held to a practical minimum by such practices as: 1) reducing the area and duration of exposure of earth fill and earth fill source areas; 2) stocking and replacing top soil on disturbed areas; 3) mulching areas likely to produce significant erosion; 4) sprinkling of earth fill source areas and other disturbed areas to minimize the production of dust; 5) scheduling and completing work by segment, where possible; 6) establishing erosion control vegetation or other pollution abatement measures as soon after work is completed as practical; 7) providing acceptable means of disposal of fuels and lubricants resulting from the operation; 8) providing sanitary facilities for disposal of sewage resulting from construction activities; 9) disposing of solid waste such as material cleared from the site, and that generated through construction activity in accordance with state regulations.

The use of pesticides and herbicides are not anticipated in the installation and operation and maintenance of this project. However, should this become necessary, all applications will be consistent with the Federal Insecticides, Fungicides, and Rodenticides Act, as amended.

Surveys by professional archeologists and by historians have been reviewed by the state historical preservation officer and the state archeologist. They have identified no archeological or historical values eligible for inclusion in the National Register of Historical Places that would be impacted by the project measures. The SCS will keep alert for archeological or historical values that might be uncovered during detailed investigations or construction. Should such values be discovered, they will be immediately reported to the state historic preservation officer and the National Park Service's Office of Archeology and Historic Preservation in Denver, Colorado, and the procedures required by PL-93-291 will be followed.

Since this is a federally assisted local project, there will be no change in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archeological and historical resources.

Public Recreation Facilities

Recreational activities planned for this facility include boating, fishing, camping, and picnicking.

About 4.5 miles of trails will be developed around the lake for use in hiking or bicycling. About 4,800 square yards of asphalt parking lots will be installed around the lake.

Two picnic areas are tentatively planned which will contain one group shelter with a concrete floor (20' x 40'), 20 concrete tables (3' x 6'), and 10 cooking grills. About 15 camp sites will be provided. A water supply system will be installed to provide a sanitary source of drinking water and to provide water for two comfort stations with flush toilets which will be constructed in the vicinity of the picnic areas. Each of the comfort stations will be equipped with a septic tank and subsurface tile to serve as the waste disposal system. The system will be installed and serviced in accordance with Oklahoma Department of Health Bulletin No. 600. The water will come from the main which goes through the recreation area from the treatment plant to the dispersal system. One boat launching ramp, one passenger dock, and one fishing dock will be located so that the comfort stations will be nearby. All of the facilities will be constructed to facilitate their use by the handicapped.

About 60 acres of vegetative plantings will be installed around the facility for stabilization screening, and improved esthetic values. These plantings will also provide some incidental wildlife benefits. The above figures are all preliminary estimates which may be changed during the final design.

Sponsors will acquire fee simple title for all privately owned land to be used for recreation purposes in a project development where PL-566 cost sharing assistance is provided.

Rights-of-way required for public utilities, such as powerlines and pipelines needed to serve the recreational area, must be acquired by purchase or perpetual easement.

Construction of private facilities within the minimum land rights boundary is prohibited except for essential service facilities which are constructed or operated by private concessionaires on a controlled permit basis to serve the planned use of the improvement or development.

Wildlife Mitigation Measures

Wildlife mitigation measures will include about 95 acres of trees, shrubs, or other vegetation of benefit to wildlife (see Table 7, page P-40).

Although not mitigation measures, the following recommendations of the U.S. Fish and Wildlife Service will be emphasized by the SCS when

dealing with landowners involved with structures, or during installation.

1. Timber should be left undisturbed in the upper one-third of sediment pools.
2. To the degree practicable, submergence slopes of sediment pools should be constructed to inhibit emergent plant growth.
3. Provisions will be made for sediment pool drawdown.
4. Fishery management practices including fish stocking should be in accordance with the Oklahoma Department of Wildlife Conservation.
5. Disturbed areas at all structures should be revegetated with plants of value to wildlife.
6. Trees, shrubs, and grasses desirable to wildlife and water tolerant where exposed to inundation shall be preserved or established in the wildlife management units.
7. Public access to selected sites in addition to 4M should be encouraged.

OPERATION, MAINTENANCE, AND REPLACEMENT

Measures in this plan will be operated and maintained by sponsors and landowners or operators with technical assistance from local, state, and federal agencies in accordance with their delegated authorities. A specific operation and maintenance plan will be prepared for each structural measure, including wildlife mitigation measures, utilizing the watershed operations and maintenance handbook adopted for watersheds in Oklahoma. The land treatment measures will be operated and maintained in accordance with the conservation plan for each operating unit.

Land Treatment

The Lincoln County Conservation District and the Lincoln County Commission are responsible for operation, maintenance, and replacement (OM&R) of the land treatment phases of this plan. The sponsors will carry out responsibilities for both private and public land through agreements with landowners and operators to install, operate, maintain, and replace

short life elements of the treatment and adopt management measures outlined in conservation plans for each operating unit.

Establishment and OM&R of the critical area treatment is particularly important. Each conservation plan for farms, ranches, or county road systems covering critical area treatment will include provisions for OM&R and provide for access by the district, the SCS, or other federal, state, or local agencies providing technical assistance through, or acting for, the district to inspect the measures. Each such conservation plan agreement will be signed by the conservation district, the owner or operator, and the SCS, and will serve as the OM&R agreement. A period of two years after initial installation is allowed for establishment including both structural and vegetative components. During this period, the SCS will cost-share in repairs on the same basis as for initial installation. The critical area treatment will be inspected annually, after rain, drought, fire, and other occurrences that might adversely affect the treatment. The district, the SCS, and the Oklahoma Division of Forestry will perform the inspections for the first three years. The district will make the inspections for the next seven years after which inspections will be discontinued. The district will prepare reports setting forth the conditions of the treatment and any OM&R needs after each inspection, and furnish the SCS a copy of the report. The district will follow up with landowners and operators to accomplish the OM&R needs.

Operation may include those activities, such as mowing, fertilizing, removal of debris and obstructions, which will enable the measures to function as planned. Maintenance includes timely repairs such as filling of eroded areas, replanting of vegetation, repair of concrete, pipe, or similar elements. Replacement includes replacement of short life elements, of badly damaged sections of concrete, pipe, fences, or similar appurtenances as needed for continual operation.

Establishment and OM&R of other land treatment measures are also vital in achieving the objectives of this plan. The district and the SCS will make periodic reviews of the status of installation and periodic inspections of measures installed to determine any OM&R needs. Conservation plans will be updated as needed. The district will follow up with landowners and operators to accomplish the needed work.

Technical assistance for installation and OM&R of the land treatment phase of this plan will be provided by SCS, the Oklahoma Forestry Division through their going program in cooperation with the U. S. Forest Service, and other federal, state, and local agencies, through the Lincoln County Conservation District, in accordance with agreements between the agencies and the district.

Landowners and operators and county commissioners will operate, maintain, replace elements of the land treatment, and bear the costs incurred.

The district may lend, rent, or perform part of the work with district equipment and manpower. Cost-sharing assistance available through the ACP or other federal programs may be utilized as available.

Structural Measures

The Lincoln County Conservation District and the City of Prague will operate and maintain the structural measures including appurtenances and the associated wildlife mitigation measures. They will replace worn or inoperative elements when needed. The Lincoln County Conservation District is responsible for OM&R on all of the single-purpose sites while the City of Prague is responsible for OM&R on multipurpose structure 4-M including the recreation facilities and wildlife mitigation measures associated with that site.

Operation of the structural measures, appurtenances, and associated wildlife mitigation measures will include management to insure that these measures perform the functions for which they were planned. For the reservoir structures, this will consist of actions which will prevent the principal and emergency spillways from being altered or obstructed and to insure that water quality of the multipurpose structure remains suitable for a municipal water supply and for recreational purposes.

It is particularly important that the spillway areas, the floodwater detention storage areas and the recreation facilities area be kept free of unauthorized buildings, fences, roads, and the like, that might impair the operation of the structures or the recreation development. The City of Prague understands that the lands acquired in fee title for multipurpose site 4-M, and the recreation development are to be kept from private development except for essential service facilities which may be constructed or operated by private concessionaires on a controlled permit basis to serve the planned use of the improvement or development.

Operations of the multipurpose structure site 4-M will involve the withdrawal of water for municipal water supply purposes, and the maintenance of the recreation pool above elevation 856.7 feet MSL. Operation studies which took into account water yield from the drainage area above site 4-M, maximum water supply demands, and evaporation and seepage losses show that the water level of the reservoir can be maintained above elevation 856.7 feet MSL. The City of Prague will notify SCS through the state conservationist, if drawdown below the specified elevation is necessary. If it is determined that there is a continuing need for the use of recreation storage for municipal water supply purposes, the City of Prague will reimburse the federal government for all of the PL-566 funds used for the recreation development associated with that reservoir. Operation of the recreation facilities and the recreation development includes custodial, sanitation, policing, safety,

and similar services. A frequent check will be made of the facilities and their use to insure that the development is functioning as planned. Collection and disposal of solid waste in connection with operation and maintenance of the recreation facilities will be handled by the City of Prague Sanitation Department in the same manner as for the city.

The City of Prague will comply with Oklahoma State Health Department and Federal regulations governing sanitation, water quality, or chemical use, in connection with the multipurpose reservoir and the recreation development. The Oklahoma State Health Department and the City of Prague will jointly monitor sanitation and water quality. The County Health Department will monitor sanitation in connection with the recreation area. These standards are set out in the 1973 edition of Oklahoma Water Quality Standards. The sponsors and landowners or operators will operate and maintain fish and wildlife phases of the plan. Wildlife habitat areas will normally be fenced so that grazing or other uses may be restricted. The Oklahoma Department of Wildlife Conservation, the U. S. Fish and Wildlife Service, and the SCS will provide technical assistance in the operation and maintenance of the fish and wildlife resources in the watershed. Grazing or other use of mitigation areas will not be allowed without prior approval of the other agencies.

Maintenance of the earth dams, principal and emergency spillways, and reservoir areas, includes such items as: replacement of soil removed by rodents; clean out of relief wells and drains; repair of damaged riprap; stabilization of slide areas; maintenance of dikes and fills at proper elevation; replacement of eroded material in spillways and on dams and perimeter areas; immediate revegetation as needed, and mowing; as well as control of undesirable vegetation, fertilizing, controlled grazing, and removal of trash and debris likely to clog spillways or adversely affect operation. In addition to the above items, the maintenance of the recreation development also includes the timely repairs of the facilities to correct problems resulting from vandalism, normal use, and natural occurrences (storms).

Replacement in connection with all structural measures includes replacement of badly damaged elements and short life elements at the end of their useful life. Examples include replacement of fences, relief well casings and drains, trash racks, gates and valves, risers, picnic tables, and other recreation facilities.

Annual OM&R costs for the structural measures including mitigation is estimated to be \$34,110. OM&R costs for the single-purpose structures are estimated to be \$2,630. The Conservation District will secure funding for OM&R of the single-purpose structures from revenues for services they provide, through donations, and through financial assistance from the Oklahoma Conservation Commission. Funds are appropriated annually by the Oklahoma Legislature for use by the Commission. Appropriations and assistance to Conservation Districts by the Commission have been adequate over the years for OM&R needs in similar projects.

The City of Prague will comply with any national, state, or local regulations pertaining to operation of the water treatment facility.

The City of Prague will secure funding for OM&R in connection with multipurpose structure 4-M and the recreation development from its regular source of revenue. The city does not plan to impose use charges. However, should they later find this action necessary, any use charges will be limited to that required to repay their investment, and for operation and maintenance of the recreation development.

Specific operation and maintenance agreements between the SCS and the sponsor responsible for each structural measure, including the mitigation measures, will be executed prior to signing a land rights, relocation, or project agreement. The OM&R agreement will detail specific operation and maintenance responsibilities of sponsors and will include specific provisions for retention, use, and disposal of property acquired or improved with PL-566 cost-sharing.

Upon completion of installation, including development of associated wildlife areas, the sponsors will accept the structures for operation and maintenance. A three-year period is allowed for establishment of vegetation. During this period, any required revegetation will be cost-shared with PL-566 funds on the same basis as for the initial installation. PL-566 funds shall not be used to make repairs or correct problems resulting from poor operation or maintenance, or for replacement of short life elements of the structures.

Operation, maintenance, and replacement for the measures included in this plan have been discussed between the sponsors and the SCS. The sponsors understand their obligations. The conservation district has an employee who provides maintenance support. In addition, the Oklahoma Conservation Commission has pledged funds, to be provided on an annual basis, to assist the sponsors with OM&R expenses for each structural measure completed.

To guide or monitor operation and maintenance, inspections will be made annually, after unusually severe floods, and after occurrences of any other unusual condition that might adversely affect the structural measures. These inspections will be made by the sponsors and the SCS for the first three years, and by the sponsors thereafter. The sponsors will prepare reports of the inspections detailing the need for operation, maintenance, and replacement, and provide the SCS with a copy.

The sponsors will take such action as needed to accomplish the needed work. The SCS and other local, state, and federal agencies will

provide technical assistance in accordance with their delegated responsibilities and authorities.

Project Costs

The project costs are shown in the following table:

Item	Cost (dollars)		
	P.L. 566	Other	Total
Land Treatment - Going Program	-	497,000	497,000
Accelerated Land Treatment & Critical Area Treatment	1,848,530	597,235	2,445,765
Structural Measures	<u>1,913,260</u>	<u>787,040</u>	<u>2,700,300</u>
TOTAL PROJECT	3,761,790	1,881,275	5,643,065

Construction costs from PL-566 funds will amount to \$1,269,400 and other funds will provide \$415,500 toward construction for a total of \$1,684,900.

ENVIRONMENTAL SETTING

Physical Resources

The Robinson Creek Watershed drains 40,320 acres (63.0 square miles) in central Oklahoma. The watershed is composed of five principal and numerous minor tributaries. The largest of these, and the only one named, is Spring Creek. All of the tributaries as well as Robinson Creek are classed as intermittent. Robinson Creek rises near the southeast corner of Lincoln County, three miles west and two miles south of Prague, and flows in a northerly direction for about 12 miles to its confluence with the Deep Fork River.

The southeast edge of the watershed extends to the northwest edge of Prague (population in 1970, 1,802). No other organized towns are in the watershed. The western edge of the watershed is about 35 miles east of the Oklahoma City metropolitan area. The population of the watershed is predominantly rural. However, in recent years, the population has increased as people who work in adjacent metropolitan areas have moved to small acreages in the watershed.

The watershed has 2,375 acres of floodplain. This is the major problem area; troubled by frequent and severe floods with their associated damages. The 37,945 acres of upland are the second major problem area. This portion of the watershed is troubled by extensive sheet and gully erosion.

The watershed is located in the Arkansas-White-Red water resource region and the Deep Fork River sub-region. The major portion of the watershed is in the Cross Timbers land resource area, which is represented by light colored sandy soils with reddish subsoils developed from sandstone and sandy shale parent materials under an oak-hickory Savannah surface vegetation. A small part of the watershed is in the Central Reddish Prairies Land Resource area. This area is represented by dark soils with clayey subsoils developed from clay shales and limestones under a tall grass climax vegetation.

Most of the upland soils are deep to moderately deep, medium textured, slowly permeable to permeable, and moderately productive. There are a few areas of deep, medium textured to fine textured, permeable to slowly permeable soils. The upland topography in Lincoln County, and in the watershed, is gently rolling to hilly. Surface elevations range from 1,150 feet in the northwest to about 800 feet mean sea level in the southeast. The watershed is in the southeast corner of the county. Most of the upland soils are moderately productive. The stream channel gradients average about seven feet per mile.

The floodplain soils are mostly medium textured, permeable, and are very productive. Some high terraces are found adjacent to the floodplain. These terraces contain soils which are permeable, medium textured, and are moderately to highly productive (21). 1/

The floodplain soils have developed from Recent alluvium while the soils on the high terraces were formed from Pleistocene deposits. The upland soils were formed over limestones, sandstones, shales, conglomerates, and mudstones of Pennsylvanian and Permian age (2).

A soil association is composed of a distinctive proportional pattern of soils in a distinctive landscape. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. There are four soil associations found in the watershed: 1) Port-Pulaski soils are deep, level or nearly level, loamy soils found on the floodplain; 2) Darnell-Stephenville soils are very gently to strongly sloping, loamy soils which vary from very shallow to deep over sandstone found on forested uplands; 3) Renfrow-Vernon-Bonham soils are very gently sloping to moderately steep, loamy, soils which vary from shallow to deep over clay or shale found on prairie uplands; 4) Konawa-Dougherty-Teller soils are deep, nearly level to strongly sloping, sandy to loamy soils found on the high terraces along the floodplains (21).

These soils are generally moderately leached, light colored, moderately acid, and have reddish, sandy, clay loam subsoils. Considerable invasion of oaks has occurred in the past half century, particularly on the moderate depth to very shallow soils. These soils are generally very low in phosphorus and nitrogen and low in potassium and calcium (9).

The Cross Timbers Resource Area within which the watershed lies is a large wooded area of rolling to hilly sandstone uplands extending from the Kansas line to Texas. It is an area of scrubby timber in which old growth is more or less open and park-like. Cutting and burning have caused prolific sprouting of the post and blackjack oaks to form many thickets. The slopes are steep and divides rather narrow. Steeper slopes generally follow east-facing escarpments. The watershed lies in a portion of the Cross Timbers area which is less ridgy and does not rise so distinctly above the surrounding prairies as that to the east which contains harder sandstones. Tree growth is restricted to the soils developed from sandrocks, while the clay soils support grasses. Prairie openings usually occur on clayey lower slopes or clay knobs which locally rise above the wooded hills (9).

The watershed has a climate characterized by pronounced day-to-day changes in the weather but only gradual seasonal changes. Spring and autumn months are mild with warm days and cool, pleasant nights. Summers are usually long and hot, and winters are comparatively mild and short.

1/ Numbers in parenthesis at the end of sentences denote the number of the reference in the bibliography.

The watershed lies in the sub-humid climatic zone. Average daily maximum temperatures range from around 48 degrees in January to 95 degrees in July and August, while daily minimum temperatures average about 28 degrees in January and 70 degrees in July and August. The lowest temperature recorded at Chandler, the closest weather station to the watershed, is -20 degrees and the highest is 118 degrees. The average annual growing season of 210 days extends from April 1 to October 29. The average annual precipitation recorded at Chandler is 34.4 inches (2).

Air quality in the watershed is generally good although it lies in an Air Quality Control Region which is presently designated as a non-attainment area for ambient air contaminant concentration levels for both particulate matter and photochemical oxidants. This means that contaminant concentration levels are exceeding the levels set by the National Ambient Air Quality Standards. The watershed falls in the same region as Oklahoma City and consequently regional ratings are based on those of the metropolitan area. Of the 25 monitoring stations in the Oklahoma City metropolitan area, only 4 stations were below the recommended levels in 1974 and only one station was below the standard in 1975 (10). Since the watershed area lies about 35 miles east of the Oklahoma City metroplex, and the prevailing winds are from the southwest, much of the contaminants from the city area are moved away from the watershed.

The value of produced mineral resources in the Oklahoma Water Resources Region VIII (in which the watershed lies) in 1968 amounted to about \$185 million, most of which was from oil and gas. Cement, chemical quality and agricultural quality lime, coal, copper, manganese, volcanic ash, sand, gravel, and the raw materials for the production of glass and bricks are all found in Region VIII. However, none of these materials is presently found in the watershed in sufficient quantities for economic production with the exception of oil and gas (2). Sand pits could be developed in the area but none are presently operating in the watershed.

The present land use in the watershed is:

<u>Land Use</u>	<u>Acres</u>	<u>Percent</u>
Cropland	4,072	10
Pasture	11,458	28
Range	14,460	36
Forest	9,546	24
Miscellaneous	784	2
TOTAL	40,320	100

Floodplain land use is:

<u>Land Use</u>	<u>Acres</u>	<u>Percent</u>
Cropland	967	40.7
Pasture	1,065	44.9
Range	160	6.7
Miscellaneous	<u>183</u>	<u>7.7</u>
Total	2,375	100.0

Water for livestock and rural domestic use is supplied from farm ponds and wells. Well water in the watershed is obtained from Recent alluvial deposits along the major streams or from the Garber-Wellington or Vamoosa Formations. Yields of 150-250 gpm (gallons per minute) can be expected from the alluvial deposits, while the Garber-Wellington will yield as high as 400 gpm. 200 gpm is average. The Vamoosa formation also supplies about 200 gpm in most wells.

The chemical quality of groundwater from the alluvium is generally fair to good. Dissolved solids concentration ranges from 190 to about 2,800 mg/l (milligrams per liter). Hardness is the most troublesome chemical characteristic of water in the alluvium; several samples contained more than 500 mg/l.

The chemical quality of groundwater from the Garber-Wellington and the Vamoosa is generally good and the water is suitable for most uses. Dissolved solids concentration of water from the Garber-Wellington ranges from about 100 to 500 mg/l. The water is generally of the calcium magnesium bicarbonate type in the watershed. Water from the Vamoosa Formation has dissolved solids concentrations which ranges from about 300 to 1,500 mg/l. Hardness and sulfate are the most troublesome chemical characteristics of the water from this formation.

A large part of the watershed is underlain by shale, siltstone and sandstone. Wells in these rocks commonly yield only a fraction of a gallon per minute up to as high as 20 gpm from the thicker, fractured, sandstone layers. Possibly as many as 20 percent of the wells drilled into these rocks do not yield enough water for household use, or the water is too highly mineralized for most purposes.

The chemical quality of groundwater from rocks in this area is highly variable. Water from sandstone is least highly mineralized, while water from shale, particularly shale containing coal beds, is most highly mineralized (2).

Surface water in the watershed is located in numerous farm ponds, the intermittent streams, and the section of the Deep Fork River which forms one boundary of the watershed.

Published sources of water quality data are not available for the Robinson Creek Watershed. A regional report by the Oklahoma Water Resources Board rates the quality of tributary water as good (on a good, fair, and poor scale) for both municipal and irrigation usage on the Kickapoo Nations Watershed which is just a few miles north and west of Robinson Creek. The quality is rated as fair on the mainstem of the Deep Fork River. The reduction in mainstem quality is attributed to the reach above Robinson Creek which includes the Oklahoma City and Chandler drainage and sewage discharges and a higher intensity of oil field activity (2).

A partial-record water quality station on Dry Creek at Kendrick is located on the next major tributary on the north side of the Deep Fork River from Robinson Creek.

Based on a limited number of samples primarily in the critical low flow range, the overall quality of the Dry Creek water is suitable for municipal use. However, a suspended sediment sample with an average daily discharge of 74 c.f.s. taken on July 1, 1971, showed a sediment concentration of 4,160 mg/l or a rate of 696 tons per day. Two similar samples taken on March 10, 1973, with a maximum discharge of 3,490 c.f.s. and a daily average discharge of 842 c.f.s. had calculated sediment discharge rates of 6,090 and 3,060 tons per day. Although sediment loads may adversely affect the visual quality of the water, it apparently has not affected the chemical quality.

Soil survey data indicates that about 80 percent of the Dry Creek drainage area is in the Darnell-Stephenville soil association group. Since the Robinson Creek Watershed has about 70 percent of its land area in this soil group, and the land usage is similar, the sediment pollution is expected to be similar. Water quality data from Dry Creek should approximate data which would be gathered from the Robinson Creek Watershed. To check this data, the SCS contracted with Oklahoma State University to make a water quality study on Robinson Creek Watershed.

The O.S.U. study compared Robinson Creek without floodwater retarding structures to Quapaw Creek with structures. Quapaw Creek Watershed is the adjacent watershed to the west and a system of floodwater retarding structures has been in place for several years. Soil types and land use in the two watersheds are very similar and the study determined that data collected from Quapaw Creek could be compared with that collected from Robinson Creek. Water sampling stations were located at three

locations in the upper reaches of Robinson Creek. Automatic sampling devices were used to collect a 500 ml (milliliter) sample when a one-foot rise or fall occurred in the water level of the stream. Two of the stations were located on the mainstem of the creek and the third was located on a tributary. The data from this study is presented in Appendix D.

The quality of the stream environment was also measured by the O.S.U. study. The measure of biological conditions was taken as species diversity, which is a measure of the distribution of individuals among species. The species used for this study were the benthic macro-invertebrates (bottom dwelling insects, worms, mollusks, etc.), since they are relatively non-motile and constitute living, continuous monitors of the quality of the stream environment. The data from this part of the study is presented in Appendix E.

In the Robinson Creek basin, winter diversity was about the same in all streams, but summer diversity decreased sharply downstream. Diversity progressively and drastically decreased downstream due primarily to the scouring and flushing action which removed many benthic organisms (6).

There are no wetland areas as defined in Circular 39 of the U. S. Department of the Interior, Fish and Wildlife Service, in the watershed.

Present and Projected Population

The population distribution in Lincoln County in 1970 was 26.3 percent urban and 73.7 percent rural. Census figures for 1970 indicate a 1.4 percent in migration into the county since 1960. In 1970, the county population was 19,482 (20 per square mile). By the year 2020, the county population is expected to be 36,215 (37 per square mile). The estimated population of the watershed in 1970 was about 926 and it is expected to increase steadily. Of the total population in the county in 1970, 858 or 4 percent were black (5).

Economic Resources

The farms and ranches in the watershed are privately owned. There is no federal land within the watershed.

The major farm or ranch enterprise is beef production. The primary use of cropland is for growing feed in support of the livestock industry. There are about 188 farm and ranch units in the watershed. The size of these units ranges from about 40 to 1,700 acres. However, most fall in the 160 to 320 acre size.

The primary crops grown on the floodplain are forage sorghum, wheat, and alfalfa. Alfalfa is grown only on the floodplain. Sorghums grown are primarily used for forage.

The principal use of the uplands is for livestock grazing. Some of these upland grazing areas have been established to tame pastures. About 30 percent of the area is covered by scattered timber and thickets of blackjack and postoaks. These areas are included in the grazing lands and they also support some firewood cutting.

In 1975 the market value of land ranged from \$200 to \$600 per acre for upland and from \$150 to \$700 per acre for bottomland.

Federal and State highways and county roads are adequate to provide ready access to markets for watershed residents. Many of the county roads have been hard surfaced or graveled.

The watershed is in an area classified as an area of "substantial unemployment." That is, unemployment is equal to 6 percent or more of the total work force, discounting seasonal or temporal factors. In March, 1976, unemployment in Lincoln County was 9.2 percent (15).

Fish and Wildlife Resources

The diversity of land use has created a situation attractive to many species of wildlife. Some of the more important species include white-tailed deer, bob-white quail, fox squirrel, mourning dove, songbirds and associated predator species. Fur bearers are common, especially along the tributaries of Robinson and Spring Creeks. The Rio-Grande turkey and grey squirrel are found infrequently in the watershed. Most of the land within the watershed is privately owned, yet a considerable amount of hunting occurs. Quail, rabbit, squirrels, dove and deer are the more heavily hunted species. Raccoons, waterfowl and coyotes are also favorites of hunters within the watershed. Many species of songbirds are found especially along the heavily wooded bottomland sites. Lincoln County has had one of the better deer herds within the state in the past, even though the deer habitat acres have been decreasing slightly. There are presently 12,617 acres of woodland habitat and 22,023 acres of openland habitat.^{1/} These acres have been fluctuating and are projected to be 8,789 acres of woodland habitat and 24,562 acres of openland habitat by the year 2010. Migratory waterfowl and shorebirds utilize the watershed ponds and creeks to minor degree.

^{1/} Habitat acres are based on a statistical formula which takes into account the additional open areas surrounding wooded areas and utilized by woodland species and the wooded areas adjacent to the open areas and utilized by openland species. Consequently, the "habitat acres" listed will match neither the acres of wooded area nor open area within the watershed.

The watershed was evaluated to determine the quality of each of the types of habitat present in the area. The habitat type is broken down into types of cover except for cropland which is separated due to the various types of cover which can be grown. The average watershed habitat rating on a scale of 1-10, with 10 representing optimum habitat conditions, is presented below:

<u>Habitat Type</u>	<u>Deer</u>	<u>Squirrel</u>	<u>Songbirds</u>	<u>Quail</u>
Bottomland Forest	6.7	7.0	7.2	5.6
Upland Forest	5.3	4.8	5.8	5.4
Cropland	3.6	2.9	3.8	3.8
Pasture	2.8	2.9	3.8	3.6
Native Range	2.8	2.6	4.1	4.1
Total Watershed	3.5	3.3	4.4	4.4

As can be seen, woody species play an important role in the value of habitat types. Had it not been for the presence of woody cover on some of the other habitat types, their ratings would have been lower.

Numerous farm ponds, the Deep Fork River, and some pools in the lower portion of Robinson Creek provide the only fishery resources of the watershed. This resource produces an estimated 150-200 pounds of fish per acre each year. This amount of production is average for this type of fishery habitat.

Common fishes found in the watershed include largemouth bass, green sunfish, orange spotted sunfish, bluegill, black bullhead, golden shiner, common shiner, and the redbfin shiner.

Recreational Resources

Recreational resources within the watershed are limited. In addition to the hunting and fishing discussed above, the only other outdoor recreational opportunities are afforded by the nearby Prague Golf Course.

Within a one-hour drive of the watershed are five waterbased outdoor recreation facilities with a combined surface area of about 40,000 acres. Facilities available include cabins, campsites with utilities, sanitary facilities, picnic tables and grills, swimming beaches, and marinas with rental boats and motors. Recreational opportunities afforded by these facilities include camping, hiking, bird-watching, picnicking, swimming, boating, waterskiing, hunting, and fishing.

However, all existing water-based recreation developments in the vicinity of the watershed are intensely utilized and both a need and a potential exists for one or more such developments in association with floodwater retarding structures in Robinson Creek Watershed.

There are also at least six other eighteen-hole public golf courses within a one-hour drive of the watershed.

Archeological, Historical, and Unique Scenic Resources

The watershed was surveyed by a professional archeologist to locate and identify archeological resources in the watershed (4).

A total of eight archeological and historical sites were identified in this survey. Three of the sites were historic, two showed signs of both historic and prehistoric occupation, and three were tentatively identified as prehistoric.

The Oklahoma Historic Preservation Officer and the director of the Historic Sites Division of the Oklahoma Historical Society reported that there are no sites located in the watershed which are listed in, or are eligible for, inclusion in the National Register of Historic Places. There are no unique scenic areas in the watershed.

Soil, Water, and Plant Management Status

The trend in land use in recent years has been a decrease in cropland, rangeland, and woodland, and an increase in tame pastures and house locations. Many people from the metropolitan area are buying 5 to 10 acre tracts and building a home. Most of these tracts are within 2-3 miles of Highway 62 in the upper part of the watershed. This trend is expected to continue and it is also expected to result in the largest change in land use in the watershed.

Committed factors of production (land, labor, capital) are employed inefficiently on much of the upland and on the floodplain. Much of the upland is in poor condition rangeland. Until this area is improved, these production factors will continue to be used inefficiently. Inefficient use of the floodplain area is due primarily to flooding and sediment deposition.

The Lincoln County Conservation District provides assistance to landowners and operators. There are 188 farm operators in the watershed and they have 125 conservation plans. About 67 percent of the watershed is covered by these conservation agreements. An estimated 55 percent of all land treatment measures needed in the watershed have been applied.

Land treatment remains to be installed on about 30,240 acres. The following amount of land, classified by use, is considered to be adequately treated:

<u>Land Use</u>	<u>Acres</u>	<u>Percent of Watershed</u>
Cropland	918	2.3
Pasture	2,264	5.6
Range	5,690	14.1
Forest	1,103	2.7
Miscellaneous	<u>105</u>	<u>0.3</u>
Total	10,080	25.0

Projects of Other Agencies

There are no projects of other agencies in, or planned for, the project area. Projects outside the watershed which are directly or indirectly affected by the planned project include the proposed Arcadia Reservoir, a project of the Corps of Engineers to be located on the Deep Fork River about 25 miles upstream from the confluence with Robinson Creek. This project will provide flood protection to the floodplain of the Deep Fork River and will be complemented by the Robinson Creek Watershed project.

The Eufaula Reservoir, also a project of the Corps of Engineers, is located on the Canadian River, below its juncture with the Deep Fork River. The Robinson Creek Watershed project will impact on Eufaula Reservoir through a reduction in sediment deposition.

Another Corps project identified as the "Central Oklahoma Project" has been investigated. This study covered the possibility of extending navigation from the Arkansas River to the vicinity of Oklahoma City.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

The major problems within the watershed are due to misuse of the land. In past years, a major portion of the upland area was cultivated. Erosion became a problem in the uplands before the soil conservation movement got started and it still continues to be a problem. Over the years much of the top soil eroded away, and as the remaining subsoil was infertile, crop yields decreased rapidly. A great deal of this cropland was abandoned and returned to native grass through the stages of plant succession.

The present major agricultural enterprise in the watershed today is livestock production. Many of these "native grass" areas were grazed nearly from the time that cropping ceased. Consequently, large areas are still at the lower end of the plant succession scale and few of the high quality perennial native grasses are present. Continued overuse has prevented the establishment of perennial species on large areas and active erosion is still occurring in many places.

The inefficient use of committed factors of production is very evident in this watershed. Production costs remain the same regardless of yield. In much of this upland area, production from the low quality range or pastured areas is limited. About 65 percent of the watershed is in pasture, range, or forested range which is inadequately treated. Taxes are paid each year on these acres which produce very little income compared to their potential.

There are about 604 acres of critical sediment source areas scattered throughout the watershed whose present erosion is one of the watershed problems. Many of these areas involve more than one landowner. Some of them are so large that the average operator cannot afford adequate control measures. Many of the smaller areas have been treated in the past, and many are still being treated under the going program. Although many of the larger gullies are still eroding on the sides, the bottoms have flattened and have stabilized. Most of the actively eroding gullies which are still providing sediment to the floodplain are found in the road ditches.

Labor could be more efficiently utilized if these areas could be made more productive. If these areas were productive, a larger labor force would be required and this would affect community development and local businesses.

Another land management problem in the watershed is flooding. If flooding occurs in the spring, planting is delayed. Attempts to plow too early when the soil is wet, have resulted in the destruction of soil

structure and poor soil tilth. Planting late often results in poor stands. Flowering and seed set occurs during the seasonal dry periods when blooms are often dropped and fewer seeds are formed. Shrunken and light weight seed result. The overall quantity and quality of most field crops are reduced. If flooding occurs in the summer or fall, the crop is destroyed or severely damaged and harvests are delayed.

Another major land management problem is sediment deposition on the floodplain. Sediment destroys growing or newly seeded crops the same as floodwater does. Since most of the sediment is now from the infertile upland subsoil, fertility of the floodplain is reduced. Sediment often accumulates to such depths that it has to be removed from around pecan trees to prevent their death. Soil structure is non-existent and yields are very low from newly deposited sediment areas.

Because of these limitations, many farmers and ranchers have a low return on their investment. Consequently, they are unable to make needed improvements even though they realize they will benefit from them.

Floodwater Damage

There are four floodwater evaluation reaches in the watershed. The combined floodplain areas of the evaluated Robinson Creek tributaries inundated by the runoff from a 24-hour, 100-year frequency storm is 2,375 acres.

There are approximately 85 landowners and operators of agricultural land on the floodplain. The average annual cumulative area flooded is 2,500 acres.

The present land use of the floodplain is about 41 percent cropland, 45 percent pasture, 7 percent range, and 8 percent miscellaneous.

Flooding occurs on the mainstem floodplain at least twice a year, and in some areas flooding occurs much more frequently. Floodplain cropland use is: 13 percent alfalfa; 14 percent small grain; 16 percent forage; 2 percent native grass; 51 percent tame pasture; 4 percent miscellaneous uses.

The average annual floodwater damages to this area are \$75,500. Several times in recent years, the area has been declared a disaster area by the governor of Oklahoma due to floods.

Severe and extensive flood damage occurred from storms in June and October 1974.

Erosion Damage

Sheet erosion on cultivated and formerly cultivated land in the upland portion of the watershed is the major source of sediment.

Gully and roadside erosion is also severe. Although many gullies are starting to stabilize, there are still over 180 severely eroding gully sediment source areas in the watershed which cover over 600 acres.

Flooding has caused sheet and gully scour damage on 440 acres of floodplain. Measured by reduced productivity, damage ranges from 10 to 30 percent. Average annual damages due to erosion on the floodplain are estimated to be \$8,000.

The gross erosion rate in the watershed under present conditions is about 5.6 tons per acre per year. About 2,098 acres are losing a ton of soil or less per year. About 4,707 acres are losing from 1.0 to 3.0 tons per acre per year. About 4,235 acres are losing from 3.0 to 5.0 tons per acre each year. About 12,259 acres are losing from 5.0 to 7.0 tons per year, and about 18,021 acres are over 7.0 tons per acre per year. Included in the 18,021 acres are 604 acres of critical sediment source areas which are losing soil at considerably higher rates.

Sediment Damage

About 890 acres (39 percent) in the floodplain have been damaged by sediment deposition. In terms of reduced productivity, a total of 316 acres have been damaged 10 percent; 380 acres have 20 percent damage; 79 acres have 30 percent damage; 16 acres have 40 percent damage; 82 acres have 50 percent damage, and 16 acres have been damaged 60 percent. In addition to the reduction in productive capacity, many pecan trees have been damaged and many have died due to the depth of the sediment deposits.

One of the major problems caused by sediment has been the filling or blocking of stream channels. Much of the floodplain portion of the stream channels has gradually filled with accumulated sediment so that the channel capacities have been greatly reduced. Runoff from a rain which would have been carried by the stream channels a few years ago, now results in flooding. The flooding causes increased sediment deposition, and the cycle repeats itself.

Other sediment damage occurs when the sediment covers growing crops, wildlife food supplies, dens, nesting areas, and escape cover. Many young animals and birds are destroyed and those that remain are weakened and more subject to disease than their upland neighbors.

Average annual damages from sediment deposition total \$37,800, with \$34,300 attributable to overbank deposition and \$3,500 to Eufaula Reservoir. About 30 acre-feet of sediment from the watershed is deposited in Eufaula Reservoir annually.

Water quality, though satisfactory from the standpoint of dissolved solids, is adversely affected by sediment. The problem of sediment has multiplied many-fold with agricultural development. These practices not only increased suspended sediment, but increased the bedload of sand which has resulted in damage to agricultural land when deposited overbank during flood flows. After sediment is deposited on vegetation, veterinarians advise the cattlemen to keep livestock from the area to prevent diseases caused by the consumption of these sediment polluted forages.

The average annual sediment yield at the mouth of the watershed, combining bedload and suspended load, is estimated to be about 33 acre-feet or about 53,922 tons per year. It is estimated that about 85 percent of this total is in suspension, resulting in a sediment concentration of 1,990 milligrams per liter (mg/l). Under future without project conditions the amount of suspended sediment is expected to be about 1,850 mg/l. The pollution of streams in the watershed by this suspended sediment detracts from potential practical uses of the water and related aesthetic values of the natural environment.

Drainage Problems

Due to inadequate outlets for some of the tributaries, drainage problems exist in the lower reaches of the watershed. However, until the level of the Deep Fork River is lowered, there is no practical solution to this problem.

Irrigation Problems

There are presently no irrigated areas in the watershed. However, nearly all of the bottomland and most of the uplands have soils which would benefit from supplemental irrigation.

The two major aquifers in the region, the Garber Sandstone and the Vamoosa Formation, yield relatively large quantities of water. In areas of development around Oklahoma City, the water is of good quality and suitable for most uses. Many of the tributaries of Deep Fork contain good quality water with only small concentrations of dissolved minerals. Impoundments of streamflow may provide a water of better quality than that during low flow because of mixing of high-flow water of good quality with low flow water of poor quality (2).

Most of the crops grown in the watershed would benefit from supplemental irrigation during the short, severe, dry periods which often occur in this area, and during the prolonged drouth periods which are not infrequent.

Municipal and Industrial Water Problems

There is an estimated industrial water need in the watershed trade area of 500,000 gallons per day, and there are only 300,000 gallons available. At the present time, the municipal water supply in the watershed is adequate. However, based on the present trends, the City of Prague estimates that their present water supply will only provide 33 percent of the needed water requirement by the year 2000. There are presently 400 water connections in the city. It is anticipated that this number will grow to 900 within the next few years.

Recreation Problems

Water based recreation in the watershed is provided only incidentally by a few existing privately owned farm ponds.

There are several recreation areas within a 50-mile radius of the watershed. However, there are over 65,000 people within a 25-mile radius and over 509,000 people within a 50-mile radius. Consequently, additional water based recreation is needed in the area.

Fish and Wildlife Problems

The stream fishery resources within the watershed are insignificant and the present heavy sediment load is further degrading this potential resource. However, there are a few isolated pools in the tributaries which contain some minnows and sunfish (20). The fishery resource in ponds is limited somewhat by the turbidity of water on some parts of the watershed and by the clarity in ponds on other parts. Water weeds are extremely common in the ponds where the water is clear. The heavy sediment loads result in the death of many stream macroinvertebrates. This in turn lowers the diversity of benthic organisms and this lack of diversity is carried upward through the stream food chain. Trends in the watershed indicate a reduction of cropland, rangeland, and forested range, and an increase in tame pasture and urban areas. The land use conversions associated with these trends have reduced both the woodland and the openland habitat acres. This reduction is expected to continue.

Flooding and sediment deposition have a detrimental influence on floodplain wildlife. Since floods often occur during the spring, many new-born of the ground nesting species are drowned and nests and dens are covered with sediment. Food supplies are also covered with sediment and the total wildlife population in the floodplain is usually reduced following a major flood.

Impaired drainage at the confluence of Robinson Creek and the Deep Fork River has had a detrimental effect on the production and plant species

diversity. Many trees in the bottomland area have been killed and many more are weakened by the high water table caused by channel filling and sedimentation on the floodplain. No known threatened or endangered species frequent the watershed. The Peregrine Falcon and the Southern Bald Eagle may be infrequent transients in the area (16).

Water Quality Problems

The major pollutant in watershed streams is sediment from the uplands. Records from a water quality station in an adjoining watershed (Dry Creek at Kendrick), with an average daily discharge of 74 cfs taken on July 1, 1971, showed a sediment concentration of 4,160 ppm or a rate of 696 tons per day. Two similar samples taken on March 10, 1973, with a maximum discharge of 3,490 cfs and a daily discharge of 842 cfs had calculated sediment discharge rates of 6,090 and 3,060 ton per day, respectively. Although sediment loads may adversely affect the visual quality of the water, it apparently has not affected the chemical quality. Based on soils and land use information, the water quality in the Robinson Creek Watershed will be similar to that observed in Dry Creek.

Economic and Social Problems

In 1974, 52 percent of the total farms in Lincoln County had farm sales of less than \$2,500, and another 18 percent had sales between \$2,500 and \$5,000 (19). About 62 percent of these farms were operated by a part time farmer with sales of \$50 to \$2,499 per year who is under 65 years of age and worked off of the farm 100 days or more during the year (19).

Farm operators and other family members comprised 85.7 percent of the total farm labor force in 1970. All workers per farm, included both family and hired, ranged from a high of 1.73 in June to a low of 1.13 in December.

The economy of the watershed is based on livestock production. In 1969, about 53 percent of the gross farm income was from livestock, primarily beef cattle. Another 32 percent of the income was from dairy products (5). In 1974, the gross farm income from livestock was 81 percent of the county income (19). Most of the cropland is used for the production of feed crops to support the livestock industry.

RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

The proposed action does not conflict with the objectives or specific terms of approved or proposed federal, state, or local land use policies, plans, or controls.

ENVIRONMENTAL IMPACT

CONSERVATION LAND TREATMENT

About 14,700 acres are scheduled for treatment during the planned project period. The installation of conservation land treatment measures proposed in this project will reduce flooding caused by a 2-year flood from 1,330 to 1,293 acres.

Installation of all of the land treatment measures will decrease the water runoff from the uplands about 5 percent. Vegetative practices will provide some control of the critical point sources of sediment, a major problem in this watershed.

Soil loss from the upland in the watershed will be reduced by land treatment measures from 81 acre-feet to 62 acre-feet annually, a decrease of 23 percent. This amounts to about 31,000 tons of soil per year, a large amount of this reduction will be due to critical area treatment.

The acceleration of the installation of the land treatment measures will provide a short term stimulus to the local economy. The rapid installation of these measures will result in some of the unemployed or underemployed individuals in the watershed finding employment.

The overall appearance of the watershed will be improved by the installation of the land treatment measures. Unsightly eroded areas will be vegetated and the size of the large sediment fans in the floodplain areas with their accompanying weeds will be reduced.

STRUCTURAL MEASURES

The construction of the structures will result in the conversion of about 86 acres of cropland, 125 acres of pasture, 82 acres of native range, and 157 acres of forest to a permanent pool of water (50-100 years).

Another 50 acres of cropland, 378 acres of grassland, and 159 acres of forest will be inundated temporarily by floodwater (552 acres) or occupied by dams and spillways (35 acres). It is expected that the cropland in the detention pools will eventually be converted to tame pasture due to this intermittent inundation. The 35 acres in dams and spillways will be planted to adapted vegetation suited for erosion control, controlled grazing use, and for wildlife food and cover

where practicable. The following table shows the present land use in the site areas:

Site No.	Acres Sed. Det.		Sediment Pool (acres)				Detention Pool (acres) ^{1/}				
			Crop- land	Past- ure	Range	Upland Forest	Bottom Forest	Crop- land	Past- ure	Forest Range	
1	23	18	3	7	-	4	9	-	4	5	9
2	14	25	5	-	2	3	4	-	6	13	6
3	18	46	5	6	3	1	3	-	12	8	26
4-M	225 ^{2/}	87	25	55	70	40	35	7	29	34	17
5	15	39	4	6	2	2	1	-	21	6	12
6	74	173	35	21	-	-	18	43	95	22	13
7	22	53	3	4	-	3	12	-	11	38	4
8	10	25	4	-	2	1	3	-	-	4	21
9	8	22	-	3	-	1	4	-	3	5	14
10	20	51	-	12	1	3	4	-	21	19	11
11	21	48	2	11	2	1	5	-	32	5	11
Totals	450	587	86	125	82	59	98	50	234	159	144

^{1/} Includes 35 acres involved in dams and spillways.

^{2/} Includes M & I water supply.

Land use changes due to the project are shown below. It is expected that greater urban development will occur in the vicinity of site areas. This will result in about 239 acres of land being converted from agricultural to nonagricultural use. The following table shows the present land use and the percent of the total watershed. It also shows the estimated land use without the project, with the project, and the percent of the watershed for each land use.

Land Use	Present Ac.	Percent of Area	Without Project Ac.	Percent of Area	With Project Ac.	Percent of Area
Cropland	4,072	10	3,600	9	4,425	11
Pasture	11,458	28	12,000	30	14,710	36
Range	14,460	36	17,000	42	14,431	36
Forest	9,546	24	6,520	16	5,315	13
Miscellaneous	784	2	1,200	3	1,439	4
Total	40,320	100	40,320	100	40,320	100

Most project induced land use changes will take place in the floodplain where the majority of bottomland timber exists. In view of the fact that bottomland timber occurs less frequently than other habitat types, it is this component which will affect wildlife populations the most. Without project, it is estimated that there would be 840 acres (2.1%) of the watershed in bottomland timber. With project, this area is expected to be 685 acres (1.7%). As is indicated by the habitat rating

shown in the table on page E-26, bottomland forest most nearly reaches optimum habitat conditions for the species sampled.

Upland timber in the watershed is expected to be 5,680 acres (14.1%) under without project conditions and 4,630 acres (11.5%) with project. The upland timber rates second in providing the most desirable habitat conditions.

Other land uses which provide diversity to the wildlife habitat are expected to remain fairly stable or to increase with the project installed.

The reduction in annual floodwater damages will enhance agricultural usage of the floodplain lands. Floodplain enhancement may encourage an increase in the usage of fertilizers and pesticides.

Research indicates that the planned project should have a positive effect in limiting future fertilizer and pesticide damage to downstream areas by reducing the sediment leaving the watershed by about 55 percent (1).

The possibility of eutrophication of the stream system as the result of enrichment from additions of nitrogen and phosphorus fertilizers has been considered. Algae growth is not a problem on the Robinson Creek Watershed at the present time. Research indicates that similar projects already installed have not resulted in accelerated eutrophication in streams (See Appendix F).

Sediment yield from the total watershed will be reduced from 33 acre-feet under present conditions to 18 acre-feet with the installation of the proposed project. The concentration of suspended sediment is expected to drop to about 720 mg/l. This is a reduction of about 1,130 mg/l.

Under future conditions with only land treatment applied, 2,375 acres in the watershed would be flooded by a 100-year flood. With the installation of structural measures, this area would be reduced to 1,722 acres. Flooding from a 2-year frequency storm would be reduced from 1,293 acres when only land treatment was applied to 854 acres after the planned project had been completed.

The average annual acres inundated on all tributaries will be reduced from 2,640 acres to 1,606 acres, a reduction of 39 percent.

The peak discharge on Robinson Creek, under future conditions with land treatment, at reference valley cross section 05 (Figure 2) for a 100-year frequency storm is 17,082 cubic feet per second. With the installation of this project, the peak discharge will be reduced to 6,603 c.f.s. This cross section is typical for the project.

There will be an average annual evaporation loss of about 57 inches from the surface of lakes in the watershed. Assuming that the sediment pools of the floodwater retarding structures are always full of water, the 2,138 acre-feet of annual evaporation loss would represent a 14.1 percent reduction in water yield from the project area. With the exception of the multipurpose reservoir which will have initial 100-year sediment

VALLEY SECTION - 05

810

805

800

elev.

795

msl

790

100 YEAR FLOOD LEVEL

100 YEAR FLOOD LEVEL

2 YEAR FLOOD LEVEL

2 YEAR FLOOD LEVEL

WITHOUT PROJECT

WITH PROJECT

WITHOUT PROJECT

WITH PROJECT

0 distance 200 feet 400 600 800 1000 1200

FIGURE 2
TYPICAL DEGREE OF FLOOD REDUCTION
ROBINSON CREEK WATERSHED
Lincoln Co. Oklahoma
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STILLWATER, OKLAHOMA

storage, the reduction in watershed yield will decrease from 14.1 percent immediately after construction to zero at the end of 100 years as the sediment pools are filled with sediment.

When the planned project has been completed, quality of water below the structures will be improved by a reduction of sediment now present in the streamflows. This reduction will result from proper land treatment, the trapping of sediment by floodwater retarding structures, and treatment of critical sediment source areas.

An Oklahoma State University study concluded that even partial upstream impoundment, whether or not it effectively controls downstream flooding, appreciably improves environmental conditions, as measured by species diversity, some distance downstream (See Appendix E). Following construction of the planned project, Robinson Creek is expected to have the same benthic organization as Quapaw Creek. This increase in food supply at the lower end of the food chain will improve the fishery resource and will result in a greater food supply for many species of water birds, amphibians, reptiles, and water oriented mammals.

Sediment production will undergo a slight temporary increase during the construction process due to earth-moving activities and the accompanying removal of vegetative cover. The structures and other disturbed areas will be vegetated for erosion control as soon as construction has been completed.

The presence of the 11 small lakes scattered through the watershed will provide a pleasing note to the countryside, based on the appearance of sites which have already been installed in nearby watersheds.

The construction of the multipurpose site will provide a needed source of municipal water for the City of Prague. This will allow the city to continue to expand and grow with the knowledge that they will have an adequate water supply for the foreseeable future.

The development of the recreational facilities will provide much needed recreational opportunities. This facility will attract visitors from nearby Oklahoma City who will bring new money into the watershed area. This will improve the overall social well-being of local residents and stimulate the local economy.

Of the 450 acres in permanent water surface, 98 acres of bottomland timber and 59 acres of upland timber habitat will be destroyed during construction. Other land use changes are expected to occur which will result in a total decrease of woodland wildlife habitat. In addition to the timbered areas, 86 acres of cropland and 207 acres of grassland will also be converted to water. However, other project land use changes will result in few, if any, adverse impacts on openland wildlife. New woodland habitat will be created through the addition of 40 acres of tree planting planned in the critical area treatment, and the 95 acres of wildlife habitat mitigation measures, along with the 522 acres of protected areas around the multipurpose structure. Included in this area are 60 acres of vegetation which will be used for stabilization and

visual screening which will also provide some incidental benefits to wildlife. Although this entire area will be open to the public for recreational purposes, much of the area will be sufficiently isolated to provide habitat for many species of wildlife. The addition of 450 acres of water will result in an increase in migratory waterfowl, shore birds, and other water oriented species of wildlife such as raccoon, muskrat, mink, and beaver. The addition of these scattered lakes in the upland will also increase the diversity of wildlife species in the upland since presently there are few lakes in the upland area. These new lakes also have the potential to provide a new high quality fishery resource in the watershed if they are properly stocked and managed.

In addition to the 40 acres of tree planting and the 60 acres of vegetative plantings at the multipurpose site, some 564 acres of critical area are scheduled for treatment. Nearly all of this area will eventually be established in permanent vegetation. These areas will provide new habitat of varying qualities. Elimination of these sediment sources will also reduce the damage to habitat on the floodplain. Many of these critical areas will be fenced to exclude livestock.

The impact of the planned project on the historical and archeological resources of the watershed will be insignificant. None of the historical and archeological sites discovered by the archeological survey were determined to qualify for nomination to the National Register of Historic Places. 1/

Air quality in the watershed will be essentially unaffected by the planned project. There will be a brief temporary increase in noise levels, and pollution of air from dust and exhaust emissions which are inherent in the construction process. However, construction inspectors will monitor construction activities and insure that dust abatement and other pollution control procedures are followed during construction operations. All of the sites are in a rural area, with normally brisk winds prevailing much of the year, and the minor effects of construction activities on even the local air quality will be imperceptible.

The flow regime of the streams will be significantly altered. The peak flows on the streams will be greatly reduced, and the duration of flows will be increased, due to the controlled release of floodwater from the structures. This will reduce flooding and stabilize streamflow for prolonged periods.

Some of the sites are located on geologic formations which may allow a groundwater recharge. However, these formations are separated at frequent intervals by numerous lenses of impervious shale. This will prevent any major lateral movement of groundwater and any effects will be strictly local. On the sites where some recharge occurs, the water level below the sites will rise until the streams become nearly permanent for a short distance below the sites. This distance would vary depending on the exact location of the shale lenses and the permeability of the streambed as well as the amount of water entering the streambed from other tributaries.

1/ The Archeological Survey Report is available for review at the SCS, State Office, Farm and Brumley Road, Stillwater, Oklahoma.

ECONOMIC AND SOCIAL

The planned project will have a significant beneficial effect on the economy of the area. The estimated average annual monetary floodwater, sediment, erosion, and indirect damages (Table 5) will be reduced from \$145,800 to \$64,200 by the proposed structural measures. This is a reduction of 56 percent.

The source and amount of the average annual damage reduction benefits are as follows:

Crop and Pasture	\$ 26,300
Other Agricultural	1,800
Nonagricultural	
Road and bridges	4,800
Petroleum, Industrial	7,600
Sediment	
Overbank deposition	14,100
Reservoir (Eufaula)	1,600
Erosion	4,900
Indirect	<u>20,500</u>
Total	\$ 81,600

The elimination of frequent flooding will encourage farm operators to restore floodplain land to former production levels and to intensify production practices to produce at the most efficient level possible. The benefits due to intensified land use are estimated to be \$45,800. The reduction in flooding will also enable school buses and rural mail carriers to better keep their schedules. Risks to travelers from flood damaged roads and bridges will be reduced.

Floodwater damage reduction benefits accruing to the Deep Fork River floodplain as a result of project installation are estimated to be \$5,700. These benefits are included in crop and pasture benefits in Table 5, and damage reduction benefits in Table 6.

Since the watershed is located in an area designated by the Secretary of Agriculture as eligible for rural area development under the Economic Development Act of 1965, employment benefits are used in project installation. This will provide equivalent average annual employment benefits of \$14,500.

The average annual domestic and industrial water supply benefits accruing from multipurpose site 4-M are estimated to be \$38,000. These municipal water supply benefits were determined on the basis of projected needs and costs of raw water by the consulting engineers for the City of Prague.

The provisions for recreational facilities and added water storage in the multipurpose structure will provide average annual recreation benefits of \$75,700.

The recreation facilities will generate 49,400 recreation-days of activities each year. The total primary benefits occurring as a result of flood reduction, municipal water supply, recreational water storage with the accompanying facilities, and intensive land use will be \$255,600.

The average annual external economy benefits are estimated to be \$37,600. These benefits result from an increase in the output of final consumer goods and intermediate producer goods over and above the direct output benefits. The total average annual benefits including the external economy benefits are \$293,200. However, this \$37,600 is not used for project justification.

The entire region will benefit and income will be stabilized due to the project. Regional benefits of \$37,600 are estimated to occur annually. Of this amount 5 percent will be distributed to families with an income below \$3,000, 60 percent will be distributed to families with an income of \$3,000 to \$10,000, and 35 percent will be distributed to families with an annual income over \$10,000. The average annual costs of the project are estimated to be \$206,600. The data for distribution of costs to the various income classes is not available.

The development of the municipal water supply for the City of Prague will allow this city to continue to grow and develop since the supply will be adequate for a population of about 3,025 people which the city is projected to have in the year 2000.

Eleven permanent semi-skilled jobs and 22 man-years of employment during the construction phase will be created by the project. Reduced flood damages to crops, pastures, and improvements will directly benefit 85 owners and operators of floodplain land, and 22,000 others. The average annual reduction in flood damages will be \$81,600.

The savings from reduced flood damages, the new monies brought into the area by recreational visitors, and contractors who will purchase many supplies locally and hire local labor, will provide a major stimulus to the local economy. The stabilized farm income plus the improved economic conditions of many of the low and medium income families will generate an economic stimulus which will result in local merchants

improving goods and services throughout the area. The reduction of flooding will reduce the worry and tension of local residents. The 11 small scattered lakes throughout the watershed will add a pleasing note to the appearance of the local countryside. The stabilization of the stream base flows will also improve the aesthetics of the area, as will the elimination of the unsightly sediment fans which are presently common in the floodplain.

The construction of the multipurpose site is expected to result in the displacement of three farming operations. One farm family is included in these displacements.

FAVORABLE ENVIRONMENTAL IMPACTS

The project will:

1. Reduce the rate of runoff, erosion, and flooding, with associated agricultural and nonagricultural damages, directly benefitting 85 landowners and operators and 22,000 other persons.
2. Increase crop yields and improve the quality of pastures in the floodplain.
3. Stabilize family farming operations and increase net returns of low income operators.
4. Provide opportunities for employment of local labor presently unemployed or under-employed through construction, operation, and maintenance of project measures. This will increase business activity and improve economic conditions in the Region and State as a whole.
5. Enable school buses and rural mail carriers to better keep their schedules and reduce the risks to travelers.
6. Reduce the destruction of ground nesting birds and animals in the floodplain and thus sustain a more stable, permanent game population.
7. Provide 450 acres of water habitat for water oriented species including migratory waterfowl.
8. Stabilize stream base flows.
9. Reduce the total sediment yield from the watershed.
10. Improve water quality below the structures.
11. Improve the appearance of the countryside by the addition of water surface area and the elimination of many severely eroding areas.
12. Provide a new recreational facility in the watershed area.
13. Provide a needed source of municipal water for the City of Prague.
14. Improve the physical environment of the stream so that the diversity of species of benthic macroinvertebrates will increase and provide an increased food source for water oriented wildlife species.
15. Stabilize most of the 604 acres of critical sediment source areas in the watershed.

ADVERSE ENVIRONMENTAL IMPACTS

The project will:

1. Reduce land available for agricultural production by 450 acres for the life of the project.
2. Occasionally interrupt use of land in the retarding pool areas which is subject to intermittent inundation.
3. Restrict land use on areas needed for dams, spillways, and appurtenances.
4. Decrease the present 9,546 acres of forest which provides habitat for woodland wildlife species by 1,205 acres as a result of land use changes due to the project.
5. Temporarily disrupt wildlife habitat during construction of dams.
6. Cause localized short term increases in erosion and turbidity during construction of dams.
7. Result in short term air and noise pollution caused by operation of heavy equipment during construction.
8. Increase the urban development in a rural setting which will lower aesthetic values, increase sediment, and increase pressures on wildlife species due to reduced habitat and more disturbance in the whole area.
9. Decrease water flow from the watershed by 14.1 percent per year until the sediment pools fill with sediment at which time this impact will be eliminated.
10. Displace three farming operations, including one family.

ALTERNATIVES

Alternatives considered during the formulation of the selected plan were of two basic types: those which would satisfy component needs identified by concerned publics for national economic development (NED) and environmental quality (EQ); and those which would further reduce or eliminate adverse impacts to the environment resulting from the selected plan.

The identified component needs for NED and EQ are:

NED:

1. Increase the output of goods and services.
2. Increase crop yields.
3. Reduce floodplain and upland erosion and sediment deposition to maintain the resource base.
4. Provide a municipal water supply for the City of Prague to remove the constraints on housing construction and industrial development.
5. Provide additional recreational facilities in the watershed to improve the economic activity in the area.
6. Increase employment opportunities in the watershed area of influence to increase production from the otherwise unemployed or under-employed resources.

EQ:

1. Reduce the loss of life of ground nesting wildlife species, by protecting den areas, and reducing damages to wildlife food supplies.
2. Improve areas of natural beauty by reducing the deterioration of stream channels, and protecting existing bottomland hardwoods.
3. Improve the resource base by reducing sedimentation and floodplain and upland erosion.
4. Improve the esthetics and visual quality of the watershed area by creating bodies of water in the upland and thus adding diversity to the landscape and by stabilizing the critical sediment source areas.

5. Improve the wildlife habitat of the watershed to preserve one of the diminishing biological resources of the area.
6. Improve water quality of stream flows and improve the stream ecosystems in the watershed area which will enhance and preserve the fishery resources.

Alternatives considered during plan formulation for satisfying NED and EQ component needs were as follows:

Alternative 1 - consists of accelerated land treatment alone. This alternative contains the following items:

1. Land treatment on 1,510 acres of cropland for increased production, water protection, and reduction of stream pollution by sediment.
2. Land treatment on 4,930 acres of tame pasture for increased production, watershed protection, and reduction of stream pollution by sediment.
3. Land treatment on 4,770 acres of native range to increase production and reduce erosion and sediment production.
4. Land treatment on 2,860 acres of forest for increased production and watershed protection.
5. Land treatment and grade stabilization structures on 604 acres of critical erosion areas for watershed protection and reduction of stream pollution by sediment.

Alternative 2 - is the NED plan and includes plan elements which will satisfy most of the EQ component needs. This plan consists of:

1. The same land treatment program as Alternative 1.^{1/}
2. Ten single-purpose floodwater retarding structures for reduced flooding and control of sediment.
3. One multipurpose structure for flood control, municipal water, and recreation.

^{1/} Landowners and operators have proven through long practice that the land treatment measures recommended by the SCS are not only necessary for soil preservation and proper land use, but they also result in greater economic returns. Consequently, land treatment is considered to aid in solving both NED and EQ objectives.

4. One structure-associated recreation development with basic facilities.
5. One structure-associated public access area.

Alternative 3 - Consists of accelerated land treatment and channel work. This alternative consists of:

1. The same land treatment as Alternatives 1 and 2.
2. Channel work in the floodplain to widen, deepen, and straighten the present channels so they could contain a much greater runoff.

Alternative 4 - The non-structural alternative, contains the following items:

1. The same land treatment as the other alternatives.
2. Purchase of 2,375 acres of floodplain.
3. Conversion of 2,375 acres of floodplain from agricultural uses to permanent vegetation of benefit to wildlife.

Alternative 5 - No project.

Of the alternatives considered only number 2 is viable. Viable alternatives are those plans which can be implemented with assistance under existing USDA authorities, and for which a public body has expressed a willingness to implement. The adverse impacts that would result from installation of the selected plan are discussed on page E-46. A no project alternative was considered which would avoid the adverse impacts of the selected plan.

A brief discussion of the various alternatives follows:

Alternative 1 - Accelerated land treatment alone. Application of land treatment measures alone would exert only minor effects on damages resulting from flooding and sediment production. The average annual soil loss from the watershed would be reduced from 132,000 tons to 101,000 tons, a reduction of about 23 percent. Flooding from a 2-year frequency storm would be reduced from 1,370 acres to 1,293 acres, a reduction of only 5 percent. The installation of the land treatment measures will have a beneficial effect on the wildlife in the watershed, particularly in the uplands. Use of legumes in rotations, crop residue

management, and other practices will result in an increase in food and cover for numerous species of wildlife. The stabilization of the critical areas will also provide vegetation on areas which are nearly denuded at the present time. These vegetated areas will provide what is essentially new habitat for many wildlife species depending on the vegetation used for stabilization. Although the effects of this alternative would be beneficial, the improvements would be relatively minor when all of the watershed problems are considered.

The adverse impacts of the selected plan which could be avoided if this alternative were installed are:

1. 450 acres of land to be occupied by water would not be removed from agricultural production.
2. 552 acres involved in detention pools would not be restricted in use due to intermittent inundation.
3. The areas involved in dams, spillways, and appurtenances would not be restricted.
4. About 157 acres of forestland wildlife habitat would not be eliminated.
5. Water flow from the watershed would not be reduced by 14.8 percent.
6. The short-term disturbances caused by construction activities involving the floodwater retarding structures would be avoided.

As well as avoiding all of the adverse effects from structural measures, all of the favorable effects as shown in the selected plan will be foregone. However, conditions in the watershed will not remain static. The annual damages caused by flooding will accelerate if flooding is not reduced. The realization of \$255,600 in average annual net benefits will be foregone. The cost of this alternative is estimated to be \$2,942,765.

Alternative 2 - the NED plan is the selected plan and is discussed in detail in the plan and EIS and consequently, the effects will not be repeated here.

Alternative 3 - consists of accelerated land treatment and channel work. The land treatment portion of this alternative would be the

same as alternative 1. The channel work portion of this alternative would not be able to function properly due to inadequate outlets into the Deep Fork River. Adequate outlets would require channel work on the river to function properly and the SCS does not have authority for this type of work. Consequently, this alternative was not evaluated in detail. The cost of this alternative would probably be in the multi-million dollar category.

Alternative 4 - The non-structural alternative consists of the same land treatment as the selected plan (Alternative 2) and purchase of the floodplain with a conversion of this area to permanent vegetation of benefit to wildlife. The benefits, costs, and effects of the land treatment and lack of structures are discussed in the discussion of Alternative 1. However, the woodland wildlife benefits would be greatly increased over Alternative 1. The conversion of 967 acres of cropland to permanent vegetation will reduce food supplies initially. However, if part of the vegetation planted on these areas was specifically selected for its benefit to wildlife, the food reduction would gradually be eliminated as these plants reached maturity. The 1,065 acres of tame pasture would also change considerably over the years. The elimination of annual mowing and the removal of livestock would result in a gradual increase in the amount of timber in not only this area, but also in the old cropland areas. This increase would result in an initial increase in woodland wildlife numbers and a decrease in openland wildlife numbers. However, the continuing sediment deposition would result in the death of many of these trees. Consequently, many would never reach maturity and those which did would be such species as willow and tamarac. Since these species are low quality habitat and provide primarily only escape cover, the number of woodland wildlife species will gradually decrease over the years. The \$54,600 in average annual crop, pasture, and other agricultural damages would be eliminated since the area damaged would be removed from agricultural production. However, the \$20,900 in average annual damages to roads, bridges, and the petroleum and other industries will continue to occur. The \$3,500 sediment damage to Eufaula Reservoir will continue to occur. The \$34,300 in overbank sediment damages will be reduced since much of this damage affected cultivated crops or tame pastures. However, the sediment will continue to destroy the vegetation in the floodplain each year. The \$8,000 of floodplain erosion and the \$24,500 of indirect damages will be reduced since much of this damage occurred to agricultural areas and to floodplain residents. The 85 residents of the floodplain will be displaced. Watershed income will be reduced about 10 percent due to the loss of agricultural income from the floodplain. The tax base of the county will be reduced due to the loss of the floodplain farming operations. Maintenance costs of roads and bridges will be reduced since some roads will probably be closed. Damages to the floodplain from flooding,

erosion, and sediment deposition would continue to occur as discussed in the "No project" alternative. The estimated cost of this alternative is \$3,404,640.

The adverse effects of the selected plan that might be avoided by adoption of this alternative are:

1. 450 acres of land to be occupied by water would not be removed from agricultural production.
2. 552 acres involved in detention pools would not be restricted in use due to intermittent inundation.
3. The areas involved in dams, spillways, and appurtenances would not be restricted.
4. About 157 acres of forestland wildlife habitat would not be eliminated.
5. Water flow from the watershed would not be reduced by 14.8 percent.
6. The short-term disturbances caused by construction activities involving the floodwater retarding structures would be avoided.

Alternative 5 - No project. In this watershed, all adverse effects of the planned project would be avoided and all of the beneficial effects, including \$255,600 of annual benefits, would be foregone under no project conditions. Many of the land treatment measures would eventually be established under going programs. However, since the land treatment under the on-going program would be installed over a much longer period, inflation will cause costs to be higher and benefits will accrue at a slower rate. Many of the critical sediment source areas would never be treated under this alternative. Many of these areas are so large that costs for individual landowners are too great to bear.

Valuable soil that is irreplaceable will be lost. The gully systems will continue to grow and their extension will endanger other installed land treatment measures. The visual impact of these raw, eroding areas will detract from the overall appearance of the watershed and aesthetic values will be greatly reduced. Society as a whole will lose due to the loss of this irreplaceable resource.

Without action there would be several major land use changes. It is estimated that cropland would decrease about 475 acres which is 1 percent

of the watershed. Tame pasture is expected to increase about 540 acres, 2 percent of the watershed; range is expected to increase about 2,540 acres, 6 percent of the watershed; forest will decrease about 3,000 acres, 8 percent of the watershed; and miscellaneous acres are expected to increase about 420 acres which is 1 percent of the watershed.

Damages to the floodplain from flooding, erosion, and sediment deposition would not only continue to occur but would also become more severe. As more of the main stream channels filled with sediment, more of the smaller tributaries would become blocked and swamping would become a greater problem in the watershed.

The continued flooding and sediment deposition would also have a detrimental effect on the watershed wildlife resource. Many of the larger trees are severely damaged by the deep sediment deposits and their life span is drastically reduced. Smaller trees and shrubs are often killed the same year the sediment is deposited. Consequently, woodland wildlife habitat would be reduced in the floodplain.

SHORT-TERM VS LONG-TERM USE OF RESOURCES

A coordinated plan identified as the Central Oklahoma Project has been investigated by the Corps of Engineers. This study covered alternative proposals for meeting water resource needs of the Central Oklahoma area. Considered in the planning objective of the project were navigation, flood control, drainage, recreation, fish and wildlife conservation, water supply, water quality control, irrigation, and power generation. The measures included in the Robinson Creek Watershed work plan will be integrated into the overall plan for the basin, but will exert little effect with the exception of a small reduction in sediment contributed to Eufaula Reservoir and a slight decrease in flood stages on the Deep Fork River.

There are several Public Law 566 watershed projects in the vicinity of the Robinson Creek Watershed. Most of these projects are in various stages of completion. When all are completed, their collective influence is expected to significantly reduce flooding with all of its attendant damages and associated problems. The Robinson Creek Watershed project should make a small, but significant, contribution to this reduction.

This plan provides a level of protection consistent with the needs and objectives of present and anticipated use of the floodplain lands. It provides protection for some of the most productive land in the watershed and it will aid in the orderly development of the natural resources of the area. The plan gives consideration to conservation and environmental measures to preserve the land for use by future generations. The structural measures are evaluated for a 100-year period. At the end of this period, the structures are expected to remain useful in the reduction of floodwaters.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The cost, energy for construction, and a portion of the materials are totally committed resources in this project. In addition, about 450 acres of land devoted to water will be removed from agricultural production. About 35 acres of land involved in dams and spillways will be restricted in its agricultural uses. Agricultural production on the 552 acres involved in the detention pool areas of the structures will also be restricted during periods of high water.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

General

When planning activities were authorized, the Soil Conservation Service mailed an announcement to all concerned federal and state agencies that a watershed plan was to be developed for the Robinson Creek Watershed. This announcement invited each agency to participate and make contributions to the plan.

A biological reconnaissance of the watershed was made by personnel from the Oklahoma Department of Wildlife Conservation, U. S. Fish and Wildlife Service, and the Soil Conservation Service. Wildlife habitat considerations and mitigation measures discussed in the biological reconnaissance report were included in plan development.

The City of Prague determined that an additional municipal water supply was needed. The town hired a consulting engineering firm to make a feasibility report and requested that a structure be considered for municipal and recreation water. The report showed that the selected site would hold water, that the supply would be ample to supply the city's needs, and that the water quality would be suitable for the planned uses.

Public meetings were held at Prague in September 1973, March 1975, and March 1976. More frequent meetings were held with the sponsors and steering committee in the course of planning the project. Floodwater, land treatment, water management, and environmental problems were examined by the local sponsors, interested groups, and the Soil Conservation Service. Measures to provide answers to these problems were discussed with the sponsors and other interested groups.

After a program had been formulated to meet the objectives of the sponsors, a public meeting was called. Invitations were sent to concerned federal, state, and local agencies. All other groups and individuals were encouraged to attend through newspaper notices. A large watershed map showing the location of each floodwater retarding structure was displayed at this meeting. Each site location was discussed individually and comments requested. The participants were informed that protests would be accepted verbally or by mail. No protests against this proposed plan have been received.

During the formulation of this project, discussions were held with the local sponsors and landowners of site locations about water quality, sanitation and recreation.

Displacement of people, businesses, and farm operations was discussed with sponsors and site committees during project formulation and every effort was made to identify any type of displacement.

A professional archeologist has surveyed the archeological resources in the watershed and results of the survey indicate that no significant archeological sites were discovered. The results of the survey are available for review at the SCS, State Office, Farm Road and Brumley Streets, Stillwater, Oklahoma.

The state archeologist, state historic preservation officer, and the director of the Historic Sites Division of the Oklahoma Historical Society were consulted during the assessment of the archeological and historical resources. Continued consultation and cooperation with these individuals and the archeologist employed by the Oklahoma Conservation Commission will be pursued through the final installation stages of the project.

Consultation with the Secretary of Interior will be continued through the installation phases of the project to insure that scheduling of appropriate action on these resources will not delay construction activities.

Agencies and organizations from which written comments were requested during interagency review and their responses are indicated below (NR signifies no response):

- Department of the Army - letter dated 11-16-77
- Department of Commerce - NR
- Department of Health, Education and Welfare - NR
- Department of the Interior - letter dated 12-2-77
- Department of Transportation - NR
- Environmental Protection Agency - letter dated 10-26-77
- Office of Equal Opportunity, USDA - letter dated 10-77
- Federal Power Commission - NR
- Oklahoma Historic Preservation Officer - NR
- Governor of Oklahoma - NR
- State Clearinghouse - letter dated 10-21-77
- Regional Clearinghouse - NR
- Natural Resources Defense Council - NR
- Friends of the Earth - NR
- Environmental Defense Fund - NR
- National Wildlife Federation - NR
- National Audubon Society - NR
- Environmental Impact Assessment Project - NR
- Isaac Walton League, Oklahoma Chapter - NR
- Sierra Club, Oklahoma Chapter - NR
- Oklahoma Wildlife Federation - NR
- Tulsa Audubon Society - NR

The summarization of each environmental issue, problem, or objection, raised during the formal review of the Draft Environmental Statement and work plan follows:

DEPARTMENT OF THE ARMY

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department. The draft environmental impact statement is considered satisfactory.

Response: Noted.

STATE GRANT-IN-AID CLEARINGHOUSE

The state agencies, comprising the Pollution Control Coordinating Board, have reviewed the proposed project and agree that no adverse environmental impact is anticipated. Therefore, the state clearinghouse requires no further review.

Response: Noted.

ENVIRONMENTAL PROTECTION AGENCY

Comment 1: Pertained to the National Ambient Air Quality Standards and noted that the watershed fell in areas presently designated as non-attainment areas. The EPA requested that the air quality portion of the document be strengthened.

Response: A section pertaining to air quality has been added to the Environmental Setting section of the document and additional information has been added to the Impact Section.

Comment 2: Concerned the possible pollution of the multipurpose site by the septic systems in the recreational areas and wanted assurances that poor infiltration areas would be avoided. In addition they requested that a detailed map show the location of septic tanks and tile fields and the distances to the lake shore and any water lines.

Response: The location of the comfort station in relation to the lake shore is shown on the map in Appendix H. The distance as shown is about 300 feet from the floodpool elevation. However, the exact location will be selected based on soils and topographical suitability. The document states on page E-16 that the City of Prague will comply with Oklahoma State Health Department and Federal regulations governing sanitation, water quality, or chemical use in connection with the multipurpose reservoir and the recreation development. In addition, it states that the Oklahoma State Health Department and the City of Prague will jointly monitor sanitation and water quality and that the County Health Department will monitor sanitation in connection with the recreation sites.

Comment 3: Concerned the possibility of contaminating streams or nearby bodies of water by backwash from the filtration system of the water treatment plant. It was pointed out that a National Pollutant Discharge Elimination System Permit (NPDES) would be necessary if total retention of backwash water was not planned.

Response: A statement has been added to the document to show that the City of Prague will comply with any National, State, or local regulations pertaining to operation of the water treatment facility. Current State Health Department regulations prohibit the discharge of backwash water into watercourses. The design of the treatment plant will include provisions to comply with this regulation.

OFFICE OF EQUAL OPPORTUNITY - USDA

The plan and EIS were reviewed for the purpose of assessing the Socio-economic impact of the project on minority groups living in or near the area. Although there is a 6.9 percent minority population in Lincoln County, the proposed project does not appear to have any significant adverse effect on the minority population residing in the affected area.

Response: Noted.

DEPARTMENT OF THE INTERIOR

General Comments

Comment 1: Due to the lack of consistency and clarity in the work plan and draft statement in defining proposed wildlife mitigation measures, and further inconsistencies in the statement regarding project impacts on wildlife, we consider the documents unacceptable in this regard without modification.

Response: Considerable changes have been made in both the Plan and EIS to both improve clarity and insure consistency concerning the impacts of the project on wildlife.

Comment 2: The work plan could be improved considerably by including a map to show the exact location of all areas proposed for wildlife mitigation. In this way, the plan could be used by the SCS, the Department's Fish and Wildlife Service (FWS), the Oklahoma Department of Wildlife Conservation, and the Oklahoma Conservation Commission to positively show what is to be done for conservation of wildlife resources.

Response: Land rights and easement requirements for structural measures, including mitigation, are defined during the planning stage. The general location of structural measures are shown on project maps but the exact easement requirements are not delineated until the plan has been approved by Congress. For example, 52 acres of wildlife plantings for mitigation are located adjacent to the multipurpose site. The general location is shown on the project map. Similar acreages of mitigation plantings planned are shown on Table 7, P-41 of the plan. In addition, cadastral descriptions are shown for two ten-acre plots off site from the structure locations.

Comment 3: In areas other than the work plan summary, the specified acreage of mitigation is not assured; in fact, the decision on actual amounts of wildlife plantings is deferred until just prior to construction. Examples are on pages P-4, P-41, and E-12. Compliance is needed with the instruction in the SCS Watershed Protection Handbook that for mitigation measures: "The arrangements for installing, operating, and maintaining them must be just as explicit and just as firm as for other measures."

Response: The narrative on page P-4, P-41, E-12, etc., has been modified to show the acquisition of land rights for mitigation measures are an integral part of the land rights for structural measures. The 95 acres of wildlife plantings for mitigation are, and will be, subject to the same requirement with respect to land rights as the structures.

Comment 4: The project had been studied as it related to Indian people and Indian owned lands in the area and that they could see no adverse effects or other impacts of concern to the Indian people.

Response: Noted.

Comment 5: Concerned the recreational facilities in the plan and a statewide plan which shows a need for recreational facilities in the area and suggested that the individual in charge of coordinating outdoor recreation at the state level be notified.

Response: Mr. Hesser has had an opportunity to review the plan provided the clearinghouse for state agencies use and input.

Comment 6: Discussed mineral resources and suggested that any conflicts between the planned reservoirs and existing oil and gas wells be discussed in future documents.

Response: No existing oil or gas wells are affected by the proposed structural measures. Where pipelines are involved, easements are obtained or the pipelines are moved.

Specific Comments on Work Plan

Comment 7: Page P-1, paragraph 5. It is stated that "Structural measures include 10 floodwater retarding and one flood prevention-municipal water-recreation structure, recreation facilities and 95 acres of wildlife plantings for mitigation." This is consonant with the Watershed Protection Handbook (1.3141): "Mitigation measures are classified as structural works of improvement to differentiate them from land treatment measures in terms of cost sharing and the arrangements and responsibilities for carrying them out." However, it is a matter of concern that elsewhere in the plan mitigation measures are not clearly differentiated from land treatment measures (see page P-4, paragraph 4 and page P-14, paragraph 4 for examples). One reason for our concern is the fact that land treatment measures are applied on a strictly voluntary basis by landowners and others.

Response: The narrative on pages P-4, E-8, E-10, E-13, etc., has been modified to show that mitigation is an integral part of the structural measure. Its installation is a part of the construction costs and its operation and maintenance is a part of the operation and maintenance of structural measures. The narrative on page P-14, etc., has been modified to show that the technical assistance is associated with structural measures.

Comment 8: Page P-2, para. 3. Although an annual cost for operation and maintenance of mitigation measures is recognized, the responsible entity is not named. This responsibility should be clearly designated and could be done by revising the paragraph to read: "Structural works of improvement, including the mitigation measures, will be operated and maintained by the conservation district in which they are located except for the"

Response: The suggested change has been made.

Comment 9: Page P-3, top of page. If improvement of wildlife food supplies is to be credited to the project, greater recognition of floodplain cover loss and of the usual consequences of agricultural intensification should be provided. The project contribution to floodplain population stability mentioned in the summary will affect a population that is, for other reasons, project depressed.

Response: Total land use changes expected to occur both with and without project are shown on page E-37. The changes are expected to result in a small (2%) increase in cropland and miscellaneous (1%) areas and a slightly larger increase (6%) in tame pasture. Corresponding decreases will occur in native range (6%) and forest (3%). The increase in cropland is expected to be beneficial. However, the decrease in the forest habitat is expected to result in a decrease in forestland wildlife species. The agricultural intensification mentioned above will be nearly non-existent in this watershed. Only 825 acres of new cropland will result from project installation. The problem of wildlife population stability in the floodplain is addressed in the response to the next comment.

Comment 10: The impact on upland wildlife and its relationship to woodland habitat is not adequately covered. The present animal complement on 450 acres in the areas of permanent pools (cropland, pasture, range, and forestland) will be lost. Intermittent flooding of an additional 552 acres (detention areas made up of cropland, pasture, forest, and range) may be expected to reverse those stability contributions credited for the floodplain; and in those detention areas the present food supply will be degraded. Openland species as well as those of the woodlands will be adversely affected.

Response: The effect of the project on the sediment pool areas has been discussed throughout the document. The project will depress wildlife populations in the detention pool areas. Also the effects on these areas will offset some beneficial effects which occur on the floodplain. However, there are 552 acres involved in the detention pools and there are 2,375 acres in the floodplain. Consequently, there will be a net increase of 1,823 acres of benefitted areas in the floodplain.

Comment 11: Page 4, para. 4. The status of mitigation features as a structural measure could be strengthened by their inclusion in this paragraph.

Response: The suggested addition has been made.

Comment 12: Page P-4, para. 8. It is stated that: "About 95 acres of wildlife plantings will be made to mitigate losses in connection with the structural measures" and "The exact amount and location will be determined during final design at the time of installation." We believe the commitment to 95 acres of plantings should be firmly stated and that at least the close locality and type of plantings should be resolved at this stage rather than deferring to final design stage.

Response: The statement concerning exact amounts being determined during final design has been eliminated. However, generalized plans for types of plantings for various soil types and location have been developed. Refer to comment 2 for additional information.

Comment 13: Page P-20, para. 3. It is stated that: "Wildlife mitigation areas will normally be fenced so that grazing or other uses may be restricted." Because of potential changes in land use, all mitigation areas exclusive of those at the multipurpose site should be fenced (as indicated in the table on page P-41).

Response: The document has been changed to show that all plantings will be fenced except at the multipurpose site.

Comment 14: Page P-21, para. 3. The first sentence would be more acceptable with regard to responsibilities for carrying out mitigation measures if it were changed to read: "Specific operation and maintenance agreements between the SCS and the sponsor responsible for operation and maintenance of each structural measure, including the mitigation measures, will be executed....."

Response: The suggested change has been made.

Comment 15: Page P-30. It is not clear if "other funds" represent other Federal monies or if local funds are involved. This information could be given in a footnote.

Response: other funds include the total cost for planning and installing the measures. They include all monies except those from PL-566 funds.

Specific Comments on EIS

Comment 16: The statement should include a map showing the reduced extent of the 100-year frequency flood on Robinson Creek and its tributaries. In addition, the location of water quality sampling sites (app. D, P. E-71 to 73 and app. E. P. E-75 to 77) should be indicated on a map.

Response: Maps showing the 100-year frequency floodlines are normally included for significant flooding in urban areas. Water quality sampling sites are located both inside and outside of the watershed area. Maps showing the location of the water quality sampling sites are available as part of the supporting data and a copy can be obtained from the SCS State Office, Farm Road and Brumley Street, Stillwater, Oklahoma 74074.

Comment 17: Pages E-1 and E-2. The summarized impact of the project on wildlife, beginning with "Wildlife populations will....." is deficient for the same reasons indicated in comments on page P-3. Comparable incomplete statements of adverse impact are noted elsewhere in the statement, e.g., E-46, E-50.

Response: Additions have been made to both summaries on pages P-3 and E-2 covering the openland wildlife. The response to comment 10 provides additional information.

Comment 18: Page E-5, first paragraph line 3. We believe the intent is to meet the water needs of the City of Prague to the year 2005, rather than by the year 2005.

Response: This change has been made.

Comment 19: Page E-10, para. 2. It is stated that "wildlife plantings will be incorporated in the erosion control plans of eight selected structures to mitigate wildlife habitat losses resulting from construction of the project." This statement is misleading and should be modified, as wildlife plantings for mitigation are separate and distinct from erosion control plans such as critical area treatment, etc. Also, it should be indicated that wildlife plantings will be made at two additional sites other than the eight structures.

Response: The plan and EIS have been modified to differentiate between erosion control plans, necessary to stabilize disturbed areas resulting from construction, and wildlife plantings for mitigation at ten sites.

Comments 20 and 21: Page E-13, item 6. This recommendation of the FWS needs clarification. Earlier in the planning process the FWS expected that wildlife plantings would be made primarily at sites 1, 6, 7, and 9, and at the multipurpose site. However, plantings now are planned at ten sites. In recognition of potential land use changes that may occur over the project life, the FWS recommends fencing of all wildlife plantings for mitigation with the exception of those at the multipurpose site. The appropriate revision should appear in the final statement. Page E-13, items 6 and 8. These items are related to grazing control and are integral parts of wildlife mitigation. As such, they should receive appropriate treatment rather than just emphasis by the SCS when dealing with landowners.

Response: Items 6 and 8 have been removed from the recommended list. Page E-16 paragraph 2 has been modified to provide the desired emphasis.

Comment 22: Page E-22, table. The omission of a bottomland timber or forest classification in the table of floodplain land use denies perspective for consideration of project-induced habitat loss. The watershed bottomland timber acreage mentioned at the bottom of page E-37 should be displayed.

Response: The floodplain land use shown in this table is based on interviews made by SCS personnel with floodplain landowners and operators. The actual use of the land as stated by the operator is used for this inventory. There is a description of the forested areas, and the impacts of the project on these areas, in the Impacts section of the document.

Comment 23: E-27, para. 7. It is stated that an estimated 55 percent of all land treatment measures needed in the watershed have been applied. The statement is not clearly compatible with statements on pages E-7 and E-28 that about 30,000 of the watershed's 40,320 acres are inadequately treated. A listing of measures planned with a percent completion figure for each would be helpful.

Response: The two figures are not incompatible. As an example a farmer may have terraced a crop field and be contour farming and following a conservation cropping system. However, he may not be practicing proper crop residue use. Without this practice in combination with the terracing and contour farming, this field would be classified as inadequately treated, even though most of the planned treatment measures had been applied. It is not practical to present the type of information requested.

Comment 24: Page E-37, last para. The present watershed extent of bottomland timber, indicated to be on the order of 2,000 acres in the Preliminary Investigation Report of 1975, should be addressed.

Response: The 840 acres shown in the referenced paragraph is not the present acreage. It is the predicted acreage without project. The actual acreage of bottomland forest shown in our inventories was 1,260 acres. The 2,000 acre figure given earlier was based on a brief preliminary survey. A more detailed investigation was used to determine the 1,260 acres.

Comment 25: Page E-38, last paragraph. The base for the 2,478 acre-feet of average annual evaporation loss is not clear. The rate is shown as 24 inches per year. The sediment pool areas are listed as totaling 450 acres and the retarding pools as 587 acres for a short-term maximum total at flood stage of 1,037 acres. Perhaps this could be clarified.

Response: The document has been corrected to more clearly indicate the basis for the evaporation losses.

Comment 26: Page E-41, top of page. Increases in the populations of certain named species are projected. The otter was thought to be extinct in Oklahoma until an accidental capture in eastern Oklahoma in 1975 and should not be included in the species to be benefitted.

Response: The otter has been deleted from this listing.

Comment 27: Page E-43, sixth paragraph, and page E-45, item 1. We do not find a base for the "22,000 others" who will be directly benefitted. The 22,000 figure does not seem to fit with population figures for either the watershed or county. An explanation would be helpful.

Response: This figure is based on the estimated number of people who would benefit from the availability of municipal water, recreational facilities, and construction and operation of the planned project.

Comment 28: Page E-46, item 4. The severity of adverse environmental impact is obscured in this statement. It should be made clear that the 9,546 acres of forest in the watershed will be reduced by 1,205 acres as a result of the project.

Response: The statement has been changed as suggested.

Comment 29: Page E-48, Alternative 2. The statement that EQ needs will be satisfied by the selected plan (Alternative 2) is not altogether compatible with recognized project effects to include the destruction of bottomland hardwoods rather than their protection.

Response: The document has been modified to show that Alternative 2 will satisfy most of the EQ needs.

Comment 30: Page E-49, Alternative 5. The statement that only alternative 2 is viable should be re-examined as it tends to bias the reader which is inconsistent with the intent of NEPA.

Response: Viable alternatives are those plans which can be implemented with assistance under existing USDA authorities, and for which a public body has expressed a willingness to implement. Alternative 2 is the only alternative which the sponsors are willing to implement.

Comment 31: Page E-73, last paragraph. We believe that the first sentence should appear at the end of page E-71 so the date would be directly associated with the recommended standards. The last sentence could still properly apply to the total discussion in appendix D.

Response: The suggested change has been made.

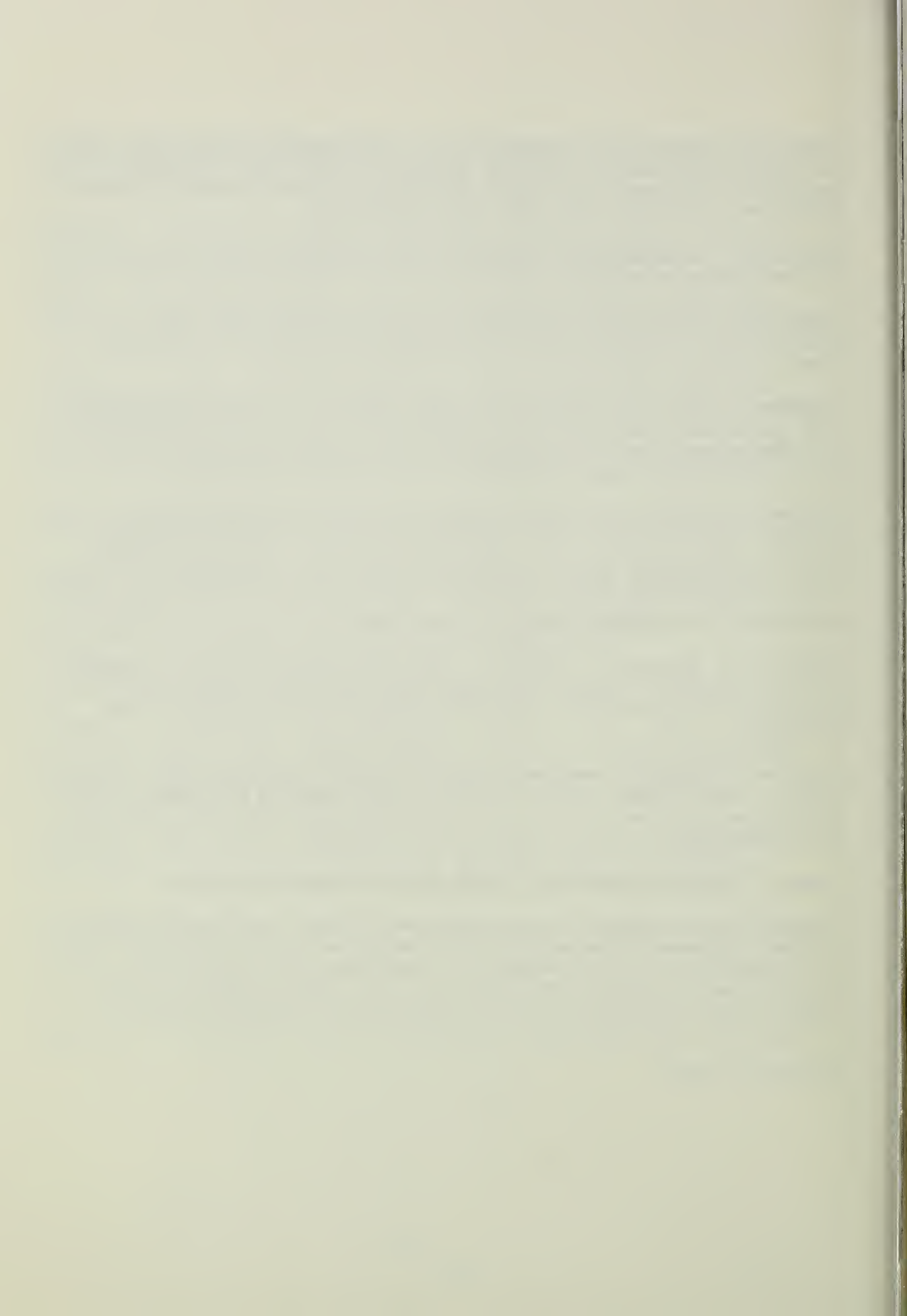
Comment 32: Appendix I, figure 2. The valley section shown is probably correctly depicted. However, as the bank is presently shown, there is a question of how the 2-year floods can spread over the expanse of the floodplain.

Response: Typically, sediment deposits create elevated berms at channel sides in most streams. Breaks in these berms combined with inflows from tributaries can create flows on the floodplain even when flow elevations are within banks.

Summary Comments on Work Plan and Draft Environmental Statement

Comment 33: In summary, a more objective portrayal of the direct and indirect influence of structural installation on wildlife habitat should be displayed in the final documents. Particulars relative to the installation and assured maintenance over the project life of no less than 95 acres of suitable wildlife plantings for mitigation should be affirmatively addressed.

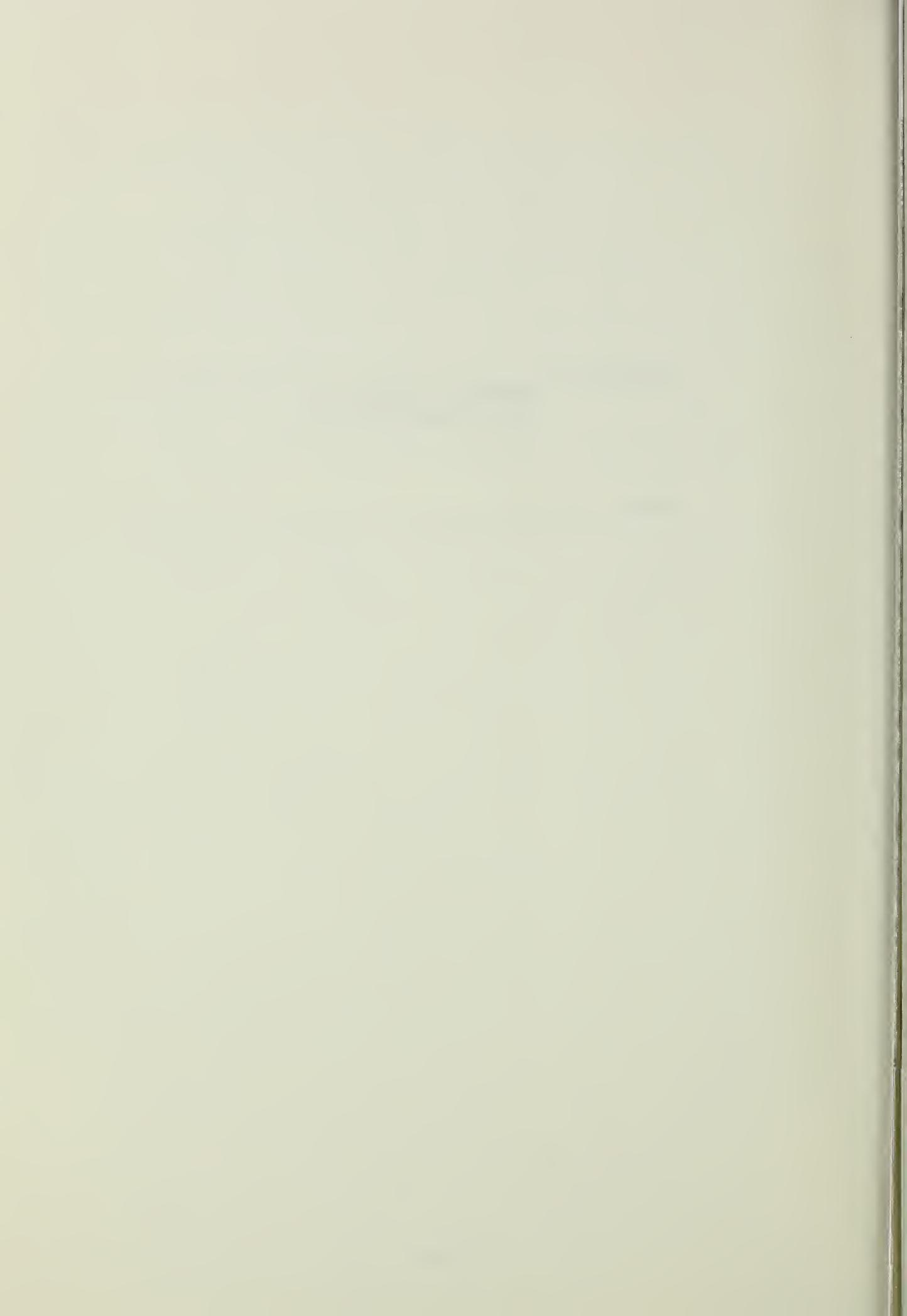
Response: Noted.



Approved by: _____

Roland R. Willis
State Conservationist

Date: _____



APPENDICES

- Appendix A - Display Accounts for Selected Plan
- Appendix B - Summary Comparison of Alternative Plans
- Appendix C - Letters of Comment Received on Draft EIS
- Appendix D - Robinson Creek Water Quality Data
- Appendix E - Impacts of Floodwater Retarding Structures on
Water Quality and Stream Benthic Organisms
- Appendix F - Water Quality Research Data
- Appendix G - Bibliography
- Appendix H - Multipurpose Reservoir Development Map
- Appendix I - Project Map

APPENDIX A

DISPLAY ACCOUNTS FOR SELECTED ALTERNATE

National Economic Development Account

Environmental Quality Account

Regional Development Account

Social Well-Being Account

SELECTED ALTERNATIVE

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT Robinson Creek Watershed, Oklahoma

Components Beneficial effects:	Measures of Effects		Components		Measures of Effects	
	(Average Annual)		Adverse effects		(Average Annual)	
The value to users of increased outputs of goods and services			The value of resources required for a plan:			
	1. Flood prevention		1. Multipurpose reservoir, structures, & recreational facilities			
	2. Municipal	\$127,400				
	3. Recreation	38,000				
	4. Utilization of unemployed and underemployed labor resources	75,700				
Total beneficial effects			Project Installation OM&R			\$147,520
			2. Project administration			34,110
			Total adverse effects			24,970
		\$255,600				\$206,600
			Net Beneficial Effects			\$ 49,000

NOTE: Land treatment beneficial effects were not evaluated. Land treatment costs are \$2,942,765.
1/ 100-years @ 6-3/8 percent interest.

2/ Price Base: Current normalized (7/76) for agricultural prices and costs. Municipal water supply based on current average cost of raw water. Employment benefits derived from 1976 construction costs. Recreation benefits determined from recreational values per recreation day published in USDA Planning Water and Related Land Resources, March 1974.

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT
Robinson Creek Watershed, Oklahoma

Components	Measures of Effects
Beneficial and Adverse Effects:	
A. Areas of natural beauty	<ol style="list-style-type: none"> 1. Create one multipurpose and 10 floodwater retarding structures with 450 acres of water surface area. 2. Intermittent inundation of 552 acres of land. 3. Average annual acres flooded will be reduced from 2,640 acres to 1,606 acres. 4. Create multipurpose lake providing recreation facilities, 225 acres of water surface, about 7 miles of shoreline, and about 60 acres of multipurpose plantings. 5. Remove about 600 acres of unsightly eroding areas by vegetation and stabilization of critical sediment source areas.
B. Quality considerations of water, land, and air resources	<ol style="list-style-type: none"> 1. Reduce sediment delivery from the watershed from 33 to 18 acre-feet per year. 2. The acres of floodplain damaged by sediment will be reduced 27 percent by project measures. 3. Stream base flows will be stabilized and water quality improved.
C. Biological resources and selected ecosystems	<ol style="list-style-type: none"> 1. Species diversity of benthic organisms will increase through fourth or fifth order streams due to structural measures. 2. Macroinvertebrate colonization of low order (first and second) streams will occur due to prolonged flow, reduced flooding, and less bottom scouring. 4. Provide 450 acres of resting area at reservoirs for migratory waterfowl. 5. Inundate woodland and openland wildlife habitat on 450 acres. 6. Provide 450 acres of wildlife habitat for water-oriented species at 11 structures scattered throughout the watershed. 7. Provide 49,400 recreation-days of waterbased activity at the multipurpose site. 8. Provide an adequate water supply for the inhabitants of the City of Prague.

February 1978

Appendix A

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT (CONT'D.)

Components	Measures of Effects
<hr/>	
D. Irreversible or irretrievable commitments	<ol style="list-style-type: none">1. Conversion of 450 acres of cropland, pasture, and woodland to permanent lake area.2. An area of 552 acres will be subject to intermittent inundation in the site areas.

February 1978

SELECTED ALTERNATIVE

REGIONAL DEVELOPMENT ACCOUNT

Robinson Creek Watershed, Oklahoma

Appendix A

Measures of Effects		Measures of Effects	
State of Oklahoma	Rest of Nation	State of Oklahoma	Rest of Nation
Income Beneficial effects:		Income Adverse effects:	
A. The value of increased output of goods and services to users residing in region		A. The value of resources contributed from within the region to achieve the outputs	
1. Flood prevention	\$127,400	1. 1 multipurpose and 10 floodwater retarding structures & recreational facilities	\$ 48,686
2. Recreation	75,700	a. Project installation	\$ 98,839
3. Municipal water supply	38,000	b. OM&R	34,110
4. The utilization of regional unemployed or underemployed labor resources	14,500	c. Project administration	1,591
B. The value of output to users residing in the region from external economies	-		23,380
Indirect activities associated with increased net returns from flood prevention, recreation, and municipal water supply			
	37,600		
Total Beneficial Effects	\$293,200	Total Adverse Effects	\$ 84,387
		Net Beneficial Effects	\$208,813
			-\$122,219

1/ 100-years @ 6 3/8 percent interest.

2/ Price Base: Current normalized, July 1976

February 1978

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT
Robinson Creek Watershed, Oklahoma

Components	Measures of Effects		Rest of Nation
	State of Oklahoma		
Employment - Beneficial Effects:			
A. Increase in the number and types of jobs.			
1. Agricultural employment	Equivalent of 5 permanent semi-skilled jobs in agriculture production.		-
2. Employment in recreation service sector.	Equivalent of 2 permanent semi-skilled jobs.		-
3. Employment in municipal water supply sector.	Equivalent of 2 permanent semi-skilled jobs.		-
4. Employment for project construction	22 man-years of employment during project construction.		-
5. Employment for project OM&R.	2 permanent semi-skilled jobs.		-
Total Beneficial Effects	Equivalent of 11 permanent semi-skilled jobs. 22 man-years of employment during project construction.		-
Employment - Adverse Effects:			
A. Decrease in number and type of jobs.			
1. Lost in agricultural employment of project take area.		-	-
Total Adverse Effects		-	-
Net Beneficial Effects	11 permanent semi-skilled jobs. 22 man-years of employment during project construction.		-

February 1978

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT
Robinson Creek Watershed, Oklahoma

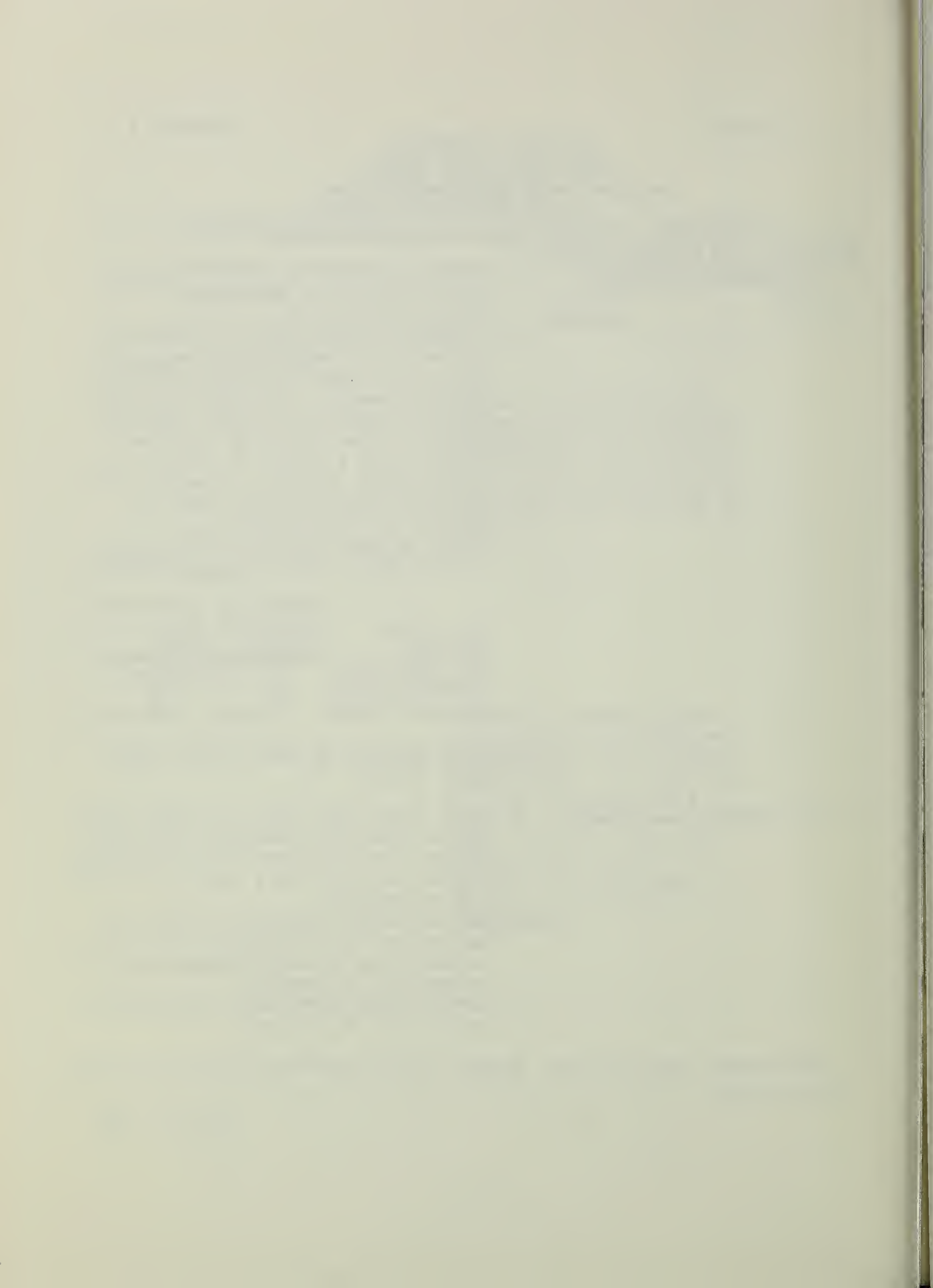
Components	<u>Measures of Effects</u>	
	State of Oklahoma	Rest of Nation
Population Distribution		
Beneficial effects:	Creates 11 permanent semi-skilled jobs and 22 man-years of employment during project construction in an area that has experienced minor population growth over the last ten years.	-
Adverse effects:	-	-
Regional Economic Base and Stability		
Beneficial effects:	Creates 11 permanent semi-skilled jobs and 22 man-years of employment during project construction in an area that has been designated as a Title IV redevelopment area under the Public Works and Economic Development Act. The designation was made on the basis of substantial unemployment.	-
Adverse effects:	-	-

February 1978

SELECTED ALTERNATIVE
SOCIAL WELL-BEING ACCOUNT
Robinson Creek Watershed, Oklahoma

Components	Measures of Effects															
Beneficial and Adverse Effects:																
A. Real Income Distribution.	<div><div><div>1. Create 11 permanent semi-skilled jobs and 22 man-years of employment during project construction.</div><div>2. 85 owners and operators of floodplain land will be directly benefited by reduced flood damage to crops, pasture, and improvements. This source of benefits will amount of \$81,600, annually.</div><div>3. Regional income stability and growth will occur as a result of the over-all project which includes recreation facilities and municipal water supply in addition to flood prevention.</div><div>4. Create regional benefits distribution of \$293,200 by income class as follows:</div></div><table><tr><td></td><td>Percent of County Inc. in Class</td><td>Percent Ben. Dist. to Class</td></tr><tr><td>Inc. Class (Dollars)</td><td></td><td></td></tr><tr><td>Less than 3,000</td><td>22</td><td>5</td></tr><tr><td>3,000 to 10,000</td><td>55</td><td>60</td></tr><tr><td>More than 10,000</td><td>23</td><td>35</td></tr></table><div><div>5. Local costs to be borne by the region total \$84,387.</div></div></div>		Percent of County Inc. in Class	Percent Ben. Dist. to Class	Inc. Class (Dollars)			Less than 3,000	22	5	3,000 to 10,000	55	60	More than 10,000	23	35
	Percent of County Inc. in Class	Percent Ben. Dist. to Class														
Inc. Class (Dollars)																
Less than 3,000	22	5														
3,000 to 10,000	55	60														
More than 10,000	23	35														
B. Life, Health, and Safety.	<div><div><div>1. Flash floods that result in rapid inundation of roads and floodplain, and endanger the lives of people will be decreased.</div><div>2. Tension and worry, as a result of floods, will be reduced.</div><div>3. Mail and school buses will be able to better keep their schedules, and risks to travelers due to damaged roads and bridges will be reduced.</div><div>4. Three farming operations, including one family, will be displaced.</div></div></div>															
C. Recreational Opportunities.	Creates 49,400 recreation-days of activities.															

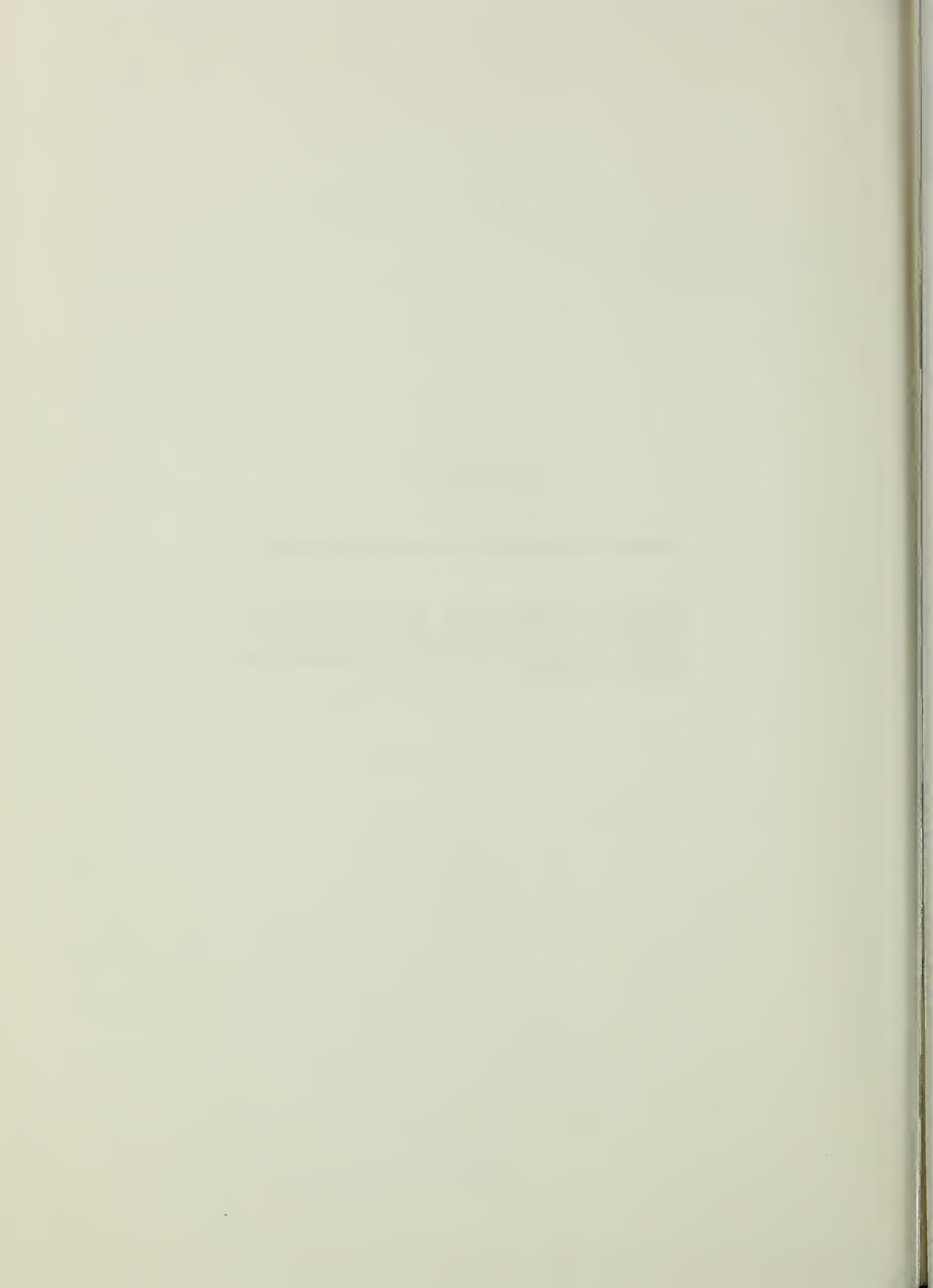
February 1978



APPENDIX B

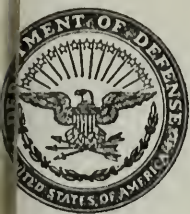
SUMMARY COMPARISON OF ALTERNATIVE PLANS

Since the Selected Plan, the NED Plan, and the EQ Plan are the same, and there were no other viable alternatives, a comparison was not required.



APPENDIX C

(Letters of comment received on Draft EIS)



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

15 NOV 1977

06 18755
W. H. F. Ford SCS

Honorable Rupert Cutler
Assistant Secretary of Agriculture
Washington, D. C. 20250

22
1. 101 X A3: 06

Dear Mr. Cutler:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the State Conservationist, by letter dated 16 September 1977, requested the views of the Secretary of the Army on the Watershed Work Plan and Draft Environmental Impact Statement for Robinson Creek Watershed, Oklahoma.

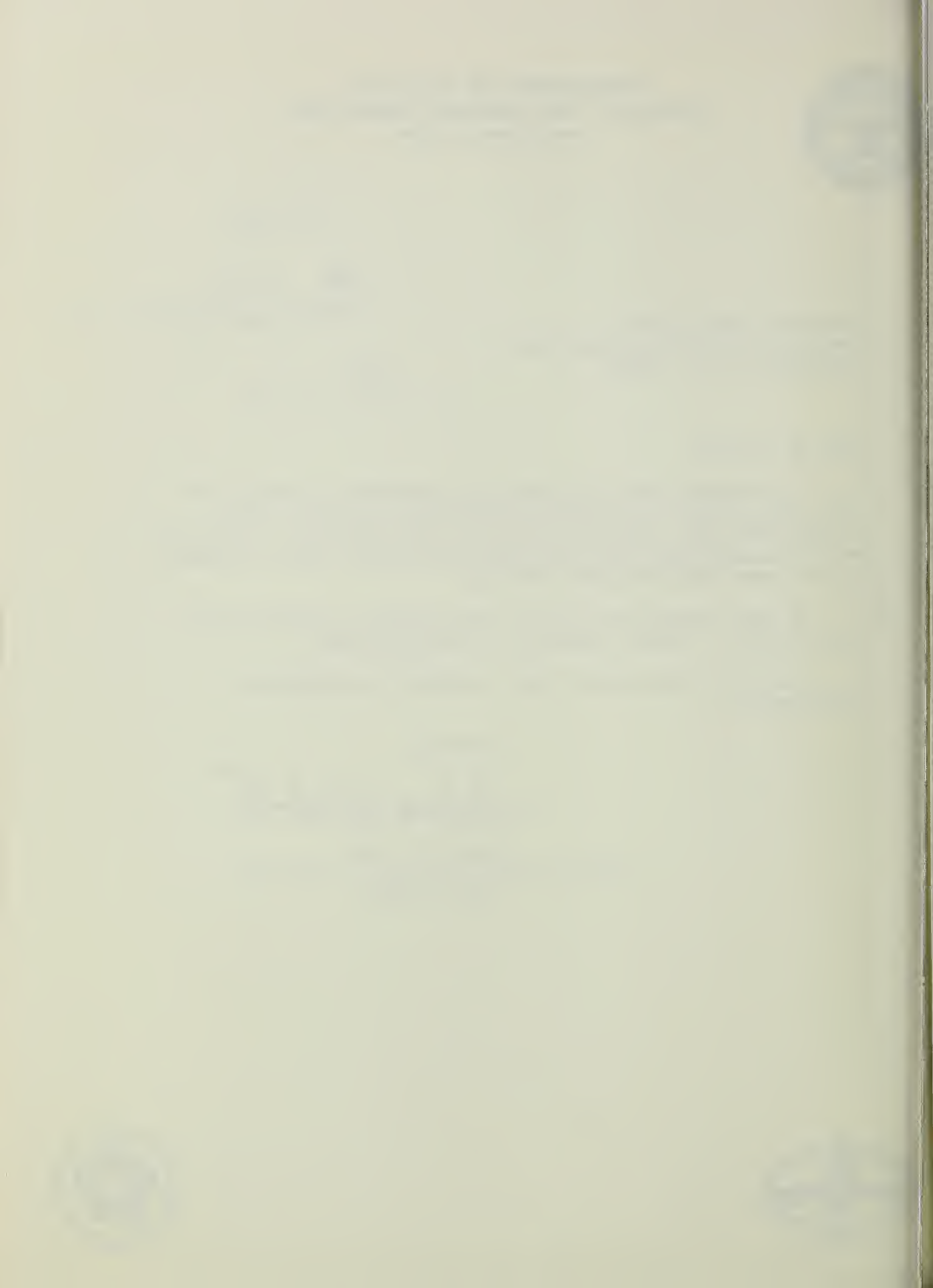
We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department.

The draft environmental impact statement is considered satisfactory.

Sincerely,

Charles R. Ford
Acting Assistant Secretary of the Army
(Civil Works)







STATE OF OKLAHOMA

State Grant-In-Aid Clearinghouse

5500 N. WESTERN

OKLAHOMA CITY, OKLAHOMA 73118

(405) 840-2811

October 21, 1977

Mr. Roland Willis
Acting State Conservationist
Soil Conservation Service
State Office
Stillwater, Oklahoma 74074

RE: 21I706--Work Plan and Environmental Impact Statement
for Robinson Creek Watershed, Lincoln County

Dear Mr. Willis:

The environmental information for the above referenced project has been reviewed in accordance with OMB Circular A-95 and Section 102 (2) (C) of the National Environmental Policy Act by the state agencies charged with enforcing environmental standards in the State of Oklahoma.

The state agencies, comprising the Pollution Control Coordinating Board, have reviewed the proposed project and agree that no adverse environmental impact is anticipated. Therefore, the state clearinghouse requires no further review.

Sincerely,

Mary Schmitt
for Don N. Strain
Director

DNS:mt



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING

1201 ELM STREET

DALLAS, TEXAS 75270

[Handwritten signature]

October 26, 1977

Mr. Roland R. Willis
State Conservationist
United States Department of
Agriculture
Soil Conservation Service
Stillwater, Oklahoma 74074

Dear Mr. Willis:

We have reviewed the Work Plan and Draft Environmental Impact Statement for the proposed Robinson Creek Watershed Project located in Lincoln County, Oklahoma. The proposed project will be implemented under the authority of the Watershed Protection and Flood Prevention Act (PL 566, 83rd Congress, 68 Stat. 66) and will provide watershed protection, flood prevention, along with municipal water supply and recreation facilities for the City of Prague. The project includes construction of ten floodwater retarding structures and one multipurpose structure designed to retard flood flows, and provide municipal and recreational water supply.

The statement discusses many of the environmental impacts which could be associated with the project; however, we offer the following comments for your consideration in developing the Final Environmental Impact Statement.

1. The final statement should recognize, as specified in the Federal Register (Volume 41, Number 138, July 16, 1976), that Oklahoma Air Quality Control Regions (AQCR) 184 and 186 are presently designated as non-attainment areas for ambient air contaminant concentration levels for both particulate matter and photochemical oxidants. This means that the contaminant concentration levels are exceeding those levels set by the National Ambient Air Quality Standards (NAAQS). It is noted that the statement provides limited air quality data and lacks adequate discussion of possible air impacts. In order to strengthen the Final, we are enclosing additional air quality data for your use in preparing a more adequate discussion on the existing air quality and on any possible air impacts that the proposed project could induce.

2. The statement indicates sanitary wastewater generated at proposed recreational facilities near the impoundment area will be treated with septic tanks and tile fields. Assurance should be given that none of the treatment facilities will present a possible pollution hazard to water quality. We request that the final statement substantiate that areas near the impoundment site with steep slopes, high water table, poorly draining soils, frequent flooding, and/or heavy runoff potential will be avoided. In addition, the final statement should include a detailed superimposed project site map showing the approximate distance and location of septic tanks and tile fields in relation to the lake shore and any water lines. This information is necessary to make an adequate evaluation of possible project impacts.

3. The water treatment plant presents a problem if, during the water treatment process, back-wash from the filtering process is discharged into any nearby streams or water bodies. If so, a National Pollutant Discharge Elimination System Permit (NPDES) will be necessary unless provisions are made for total retention of the back-wash water. This topic should be adequately discussed in the Final so that possible impacts can be properly evaluated.

These comments classify your Draft Environmental Impact Statement as LO-2. In general, we have no objection to the proposed actions as described in the Draft Environmental Impact Statement; however, additional discussion on existing ambient air quality and recreational facility wastewater treatment should be included. Our classification and a summary of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the enclosure. Our procedure is to categorize the EIS on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely,

Adlene Harrison
Adlene Harrison
Regional Administrator

Enclosures

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D C. 20250

0077 1977

OFFICE OF EQUAL OPPORTUNITY

IN REPLY 8140 Supplement 8

REFER TO:

SUBJECT: Draft Plan and Environmental Impact Statement for the
Robinson Creek Watershed, Oklahoma

TO: Roland R. Willis
State Conservationist

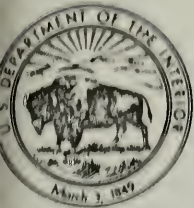
THRU: Verne M. Bathurst, Deputy Administrator
for ~~Management~~, Soil Conservation Service

The Draft Plan and Environmental Impact Statement (EIS) for the Robinson Creek Watershed was reviewed by this office for the purpose of assessing the socio-economic impact of the project on minority groups living in or near the affected area.

Census data reveals a minority population of 6.9 percent in Lincoln County. However, the proposed project does not appear to have any significant adverse effect on the minority population residing in the affected area.

Thank you for allowing us to review this statement.


for JAMES FRAZIER
Director



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-77/893

DEC 2 1977

Mr. Roland R. Willis
State Conservationist
Soil Conservation Service
Department of Agriculture
State Office
Stillwater, Oklahoma 74074

Dear Mr. Willis:

Thank you for your letter of September 16, 1977, requesting our views and comments on the work plan and draft environmental statement for Robinson Creek Watershed, Lincoln County, Oklahoma. We have the following comments.

General Comments on Work Plan and Draft Environmental Statement

Due to the lack of consistency and clarity in the work plan and draft statement in defining proposed wildlife mitigation measures, and further inconsistencies in the statement regarding project impacts on wildlife, we consider the documents unacceptable in this regard without modification. The work plan could be improved considerably by including a map to show the exact location of all areas proposed for wildlife mitigation. In this way, the plan could be used by the SCS, the Department's Fish and Wildlife Service (FWS), the Oklahoma Department of Wildlife Conservation, and the Oklahoma Conservation Commission to positively show what is to be done for conservation of wildlife resources. This action was previously suggested in a letter of September 6, 1977, from the FWS to the Watershed Staff Leader.

In areas other than the work plan summary, the specified acreage of mitigation is not assured; in fact, the decision on actual amounts of wildlife plantings is deferred until just prior to construction. Examples are on pages P-4, P-41, and E-12. Compliance is needed with the instruction in the SCS Watershed Protection Handbook that for mitigation measures: "The arrangements for installing, operating, and maintaining them must be just as explicit and just as firm as for other measures."



We have studied the proposal as it relates to the social, economic, and environmental impacts on the Indian people and Indian-owned lands in this area. There would be no Indian-owned trust lands in this jurisdictional area involved in the project. There is Indian-owned trust land some two miles north, south, and west of the drainage area boundaries, but these lands would not be adversely affected. There would be no other impacts of concern to the Indian people.

We note that trails, picnic sites, camping sites, boat launch areas and fishing facilities are included as a part of the project. The Oklahoma Statewide Comprehensive Outdoor Recreation Plan (SCORP) indicates a need for these facilities in planning Region 5, of which Lincoln County is a part.

The Oklahoma liaison officer for administration of the Land and Water Conservation Fund and SCORP programs is Mr. Abe Hesser (Executive Director, Oklahoma Tourism and Recreation Department, 500 Will Rogers Memorial Building, Oklahoma City, Oklahoma 73105.) We suggest that Mr. Hesser be contacted regarding this project and its potential for fulfilling identified recreation needs within Region 5, as he is responsible for coordinating outdoor recreation at the State level.

Known mineral resources of the watershed include petroleum, natural gas, natural gas liquids, and sand and gravel. The statement acknowledges the mineral resources of the area and states that the only current production is oil and gas. The document does not indicate whether there is any conflict between the planned reservoirs and existing oil and gas wells. We suggest that this be discussed in subsequent versions of the statement.

Specific Comments on Work Plan

Page P-1, para. 5. It is stated that "Structural measures include 10 floodwater retarding and one flood prevention-municipal water-recreation structure, recreation facilities and 95 acres of wild-life plantings for mitigation." This is consonant with the Watershed Protection Handbook (1.3141): "Mitigation measures are classified as structural works of improvement to differentiate them from land treatment measures in terms of cost sharing and the arrangements and responsibilities for carrying them out." However, it is a matter of concern that elsewhere in the plan mitigation measures are not clearly differentiated from land treatment measures (see page P-4, paragraph 4 and page P-14, paragraph 3

for examples). One reason for our concern is the fact that land treatment measures are applied on a strictly voluntary basis by landowners and others.

Page P-2, para. 3. Although an annual cost for operation and maintenance of mitigation measures is recognized, the responsible entity is not named. This responsibility should be clearly designated and could be done by revising the paragraph to read: "Structural works of improvement, including the mitigation measures, will be operated and maintained by the conservation district in which they are located except for the...."

Page P-3, top of page. If improvement of wildlife food supplies is to be credited to the project, greater recognition of floodplain cover loss and of the usual consequences of agricultural intensification should be provided. The project contribution to floodplain population stability mentioned in the summary will affect a population that is, for other reasons, project depressed.

The impact on upland wildlife and its relationship to woodland habitat is not adequately covered. The present animal complement on 450 acres in the areas of permanent pools (cropland, pasture, range, and forestland) will be lost. Intermittent flooding of an additional 552 acres (detention areas made up of cropland, pasture, forest and range) may be expected to reverse those stability contributions credited for the floodplain; and in those detention areas the present food supply will be degraded. Openland species as well as those of the woodlands will be adversely affected.

Page 4, para. 4. The status of mitigation features as a structural measure could be strengthened by their inclusion in this paragraph.

Page P-4, para. 8. It is stated that: "About 95 acres of wildlife plantings will be made to mitigate losses in connection with the structural measures" and; "The exact amount and location will be determined during final design at the time of installation." We believe the commitment to 95 acres of plantings should be firmly stated and that at least the close locality and type of plantings should be resolved at this stage rather than deferring to final design stage.

Page P-20, para. 3. It is stated that: "Wildlife mitigation areas will normally be fenced so that grazing or other uses may be restricted." Because of potential changes in land use, all mitigation areas exclusive of those at the multipurpose site should be fenced (as indicated in the table on page P-41).

Page P-21, para. 3. The first sentence would be more acceptable with regard to responsibilities for carrying out mitigation measures if it were changed to read: "Specific operation and maintenance agreements between the SCS and the sponsor responsible for operation and maintenance of each structural measure, including the mitigation measures, will be executed...."

Page P-30. It is not clear if "other funds" represent other Federal moneys or if local funds are involved. This information could be given in a footnote.

Specific Comments on Draft Environmental Statement

The statement should include a map showing the reduced extent of the 100-year-frequency flood on Robinson Creek and its tributaries. In addition, the location of water quality sampling sites (app. D, p. E-71 to 73 and app. E, p. E-75 to 77) should be indicated on a map.

Pages E-1 and E-2. The summarized impact of the project on wildlife, beginning with "Wildlife populations will...." is deficient for the same reasons indicated in comments on page P-3. Comparable incomplete statements of adverse impact are noted elsewhere in the statement, e.g., E-46, E-50.

Page E-5, first paragraph, line 3. We believe the intent is to meet the water needs of the City of Prague to the year 2005, rather than by the year 2005.

Page E-10, para. 2. It is stated that "wildlife plantings will be incorporated in the erosion control plans of eight selected structures to mitigate wildlife habitat losses resulting from construction of the project." This statement is misleading and should be modified, as wildlife plantings for mitigation are separate and distinct from erosion control plans such as critical area treatment, etc. Also, it should be indicated that wildlife plantings will be made at two additional sites other than the eight structures.

Page E-13, item 6. This recommendation of the FWS needs clarification. Earlier in the planning process the FWS expected that wildlife plantings would be made primarily at sites 1, 6, 7 and 9, and at the multipurpose site. However, plantings now are planned at ten sites. In recognition of potential land use changes that may occur over the project life, the FWS recommends fencing

of all wildlife plantings for mitigation with the exception of those at the multipurpose site. The appropriate revision should appear in the final statement.

Page E-13, items 6 and 8. These items are related to grazing control and are integral parts of wildlife mitigation. As such, they should receive appropriate treatment rather than just emphasis by the SCS when dealing with landowners.

Page E-22, table. The omission of a bottomland timber or forest classification in the table of floodplain land use denies perspective for consideration of project-induced habitat loss. The watershed bottomland timber acreage mentioned at the bottom of page E-37 should be displayed.

E-27, para. 7. It is stated that an estimated 55 percent of all land treatment measures needed in the watershed have been applied. The statement is not clearly compatible with statements on pages E-7 and E-28 that about 30,000 of the watershed's 40,320 acres are inadequately treated. A listing of measures planned with a percent completion figure for each would be helpful.

Page E-37, last para. The present watershed extent of bottomland timber, indicated to be on the order of 2,000 acres in the Preliminary Investigation Report of 1975, should be addressed.

Page E-38, last paragraph. The base for the 2,478 acre-feet of average annual evaporation loss is not clear. The rate is shown as 24 inches per year. The sediment pool areas are listed as totaling 450 acres and the retarding pools as 587 acres for a short-term maximum total at flood stage of 1,037 acres. Perhaps this could be clarified.

Page E-41, top of page. Increases in the populations of certain named species are projected. The otter was thought to be extinct in Oklahoma until an accidental capture in eastern Oklahoma in 1975 and should not be included in the species to be benefited.

Page E-43, sixth paragraph, and page E-45, item 1. We do not find a base for the "22,000 others" who will be directly benefited. The 22,000 figure does not seem to fit with population figures for either the watershed or county. An explanation would be helpful.

Page E-46, item 4. The severity of adverse environmental impact is obscured in this statement. It should be made clear that the 9,546 acres of forest in the watershed will be reduced by 1,205 acres as a result of the project.

Page E-48, Alternative 2. The statement that EQ needs will be satisfied by the selected plan (Alternative 2) is not altogether compatible with recognized project effects to include the destruction of bottomland hardwoods rather than their protection.

Page E-49, Alternative 5. The statement that only alternative 2 is viable should be reexamined as it tends to bias the reader which is inconsistent with the intent of NEPA.

Page E-73, last paragraph. We believe that the first sentence should appear at the end of page E-71 so the data would be directly associated with the recommended standards. The last sentence could still properly apply to the total discussion in appendix D.

Appendix I, figure 2. The valley section shown is probably correctly depicted. However, as the bank is presently shown, there is a question of how the 2-year floods can spread over the expanse of the floodplain.

Summary Comments on Work Plan and Draft Environmental Statement

In summary, a more objective portrayal of the direct and indirect influence of structural installation on wildlife habitat should be displayed in the final documents. Particulars relative to the installation and assured maintenance over the project life of no less than 95 acres of suitable wildlife plantings for mitigation should be affirmatively addressed.

Sincerely,

Acting
Deputy Assistant SECRETARY

APPENDIX D
Robinson Creek Water Quality Data

APPENDIX D

Robinson Creek Water Quality Data

The total dissolved phosphorus concentration in Robinson Creek varied from below detectable quantities, less than 0.005 mg/l to 1.9 mg/l. The mean values at the two main stem stations were 0.068 mg/l and 0.153 mg/l. The mean value of the tributary station was 0.17 mg/l. The concentration of phosphorus was highly variable at this station, which indicated that phosphorus concentrations in the tributaries were more heavily influenced by the amount of surface water runoff.

The mean concentration of inorganic nitrate nitrogen in Robinson Creek varied from 0.036 mg/l to 0.045 mg/l. The mean values for inorganic ammonia nitrogen found during the study were 0.497, 0.096, and 0.293 mg/l at each of the three stations.

The total amounts of nitrogen and phosphorus which left the watershed were calculated based on estimates of total water yield from the watershed. The total annual discharge of Robinson Creek was about 36,946 acre feet. The amounts of annual nutrients exported per year were calculated to be:

	<u>Pounds per acre per year</u>
Total Dissolved Phosphorus	0.26
Dissolved Nitrate Nitrogen	0.18
Dissolved Inorganic Ammonia Nitrogen	1.92
Dissolved Total Organic Carbon	39.95

The mean concentrations of chlorides were 37.6 mg/l, 41.8 mg/l, and 42.7 mg/l at the three stations. The mean cation concentrations for the tested metals are shown below in mg/l:

Station	Na	Ca	Mg	K	Fe	Zn	Cu	Cr
1	83.8	84.5	56.6	4.25	0.30	0.040	0.044	0.010
2	60.8	81.8	53.7	3.90	0.05	0.034	0.014	0.021
3	95.9	86.7	50.0	3.98	0.20	0.037	0.031	0.007

The U.S. Public Health Service recommends that sulfate and chloride concentrations not exceed 250 ppm, nitrate concentrations not exceed 45 ppm, and dissolved solid concentrations not exceed 500 ppm (although 1,000 is allowed) if other more suitable water supplies are not available (7).

The concentrations of chlorinated hydrocarbon pesticides determined were high enough at times to potentially have caused some deleterious effects upon sensitive aquatic organisms. The mean concentrations of pesticides in samples containing detectable qualities were generally below the maximum concentrations recommended in the 1972 Water Quality Criteria for freshwater aquatic life (National Academy of Sciences - National Academy of Engineering, 1972). However, the maximum recommended levels were exceeded 14 out of 15 samples. The concentration of Lindane most frequently exceeded the maximum and Lindane was found in every sample tested. Heptachlor only exceeded the maximum recommended levels on three occasions. The levels of pesticides at the three stations in parts per billion (ppb) are shown below:

Station	Date	Lindane	Hepta- chlor	Diel- drin	DDE	DDD	DDT	Endrin	PCB's
	1975								
1	3/27	2.40	2.28	-	-	-	-	-	-
1	4/1	82.42	21.73	-	-	-	-	-	-
1	4/29	32.64	-	-	10.56	-	-	-	-
1	6/5	2.05	5.60	-	-	-	-	-	-
1	7/8	6.30	8.03	4.49	-	-	-	-	-
1	9/22	-	-	-	-	-	-	-	19.00
1	10/15	-	1.50	-	-	-	-	-	60.00
Ave. of Samp. Showing Resp.		25.16	7.83	4.49	10.56	-	-	-	39.50
2	3/27	3.68	21.73	-	-	-	-	-	-
2	4/29	63.45	7.80	15.08	24.02	-	145.00	-	47.60
2	6/5	11.20	2.62	-	-	-	-	13.70	28.90
2	7/8	22.92	5.41	19.04	-	-	-	-	57.10
Ave. of Samp. Showing Resp.		15.31	9.39	17.06	24.02	-	145.00	13.70	44.53
3	4/29	3.70	-	-	-	-	-	-	-
3	6/5	10.60	9.92	14.40	-	-	-	-	27.20
3	7/8	135.36	11.04	13.28	11.00	-	-	-	-
3	9/22	-	0.15	-	-	-	-	-	66.00
Ave. of Samp. Showing Resp.		49.89	7.04	13.84	11.00	-	-	-	46.60
Ave. of All Samples									
Showing Resp.		31.39	8.15	13.25	15.19	-	145.00	13.70	43.68

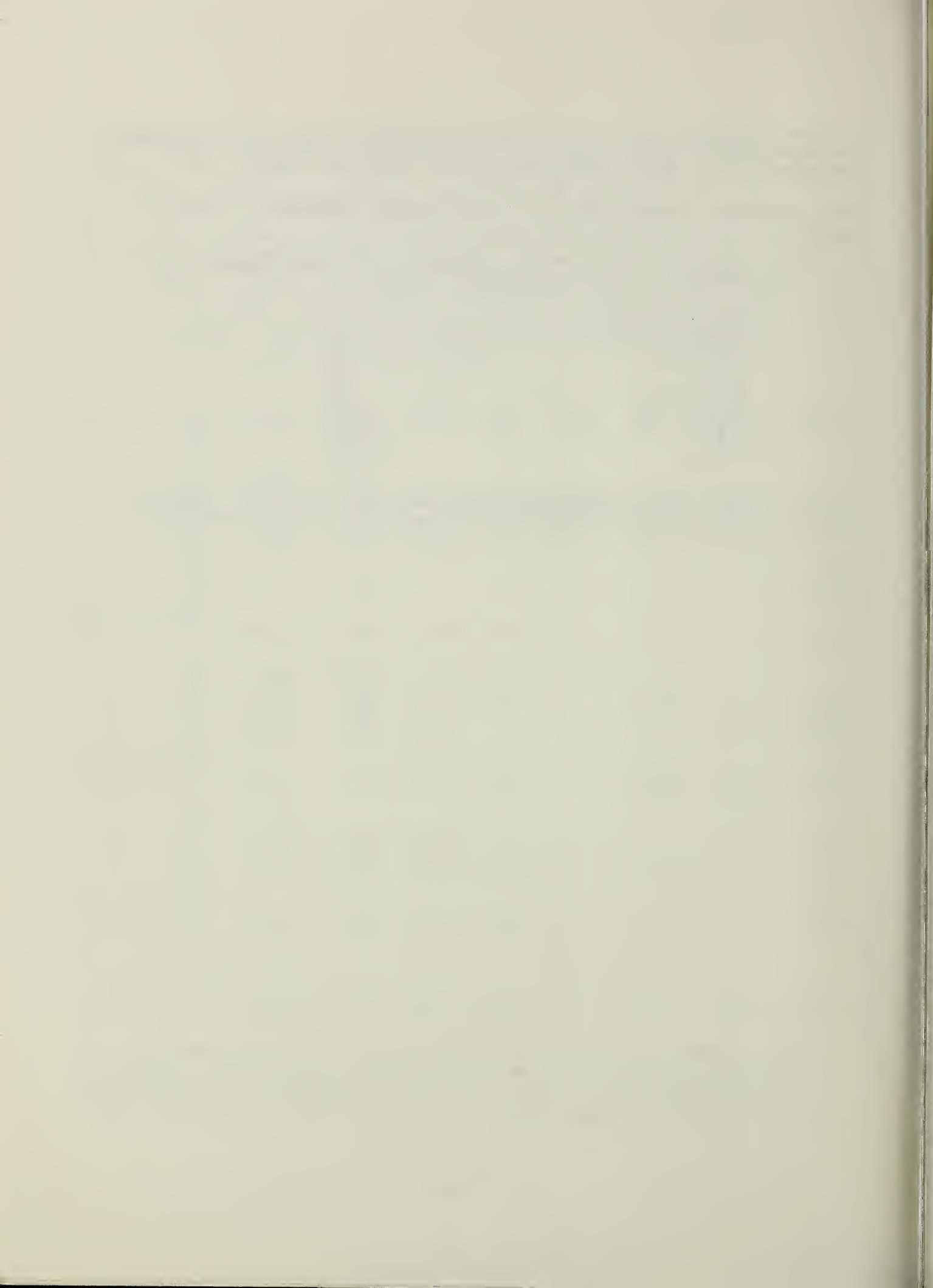
The only herbicide identified was 156 ppb of 2,4-D from a sample taken at Station 3 on July 8. The concentrations of chlorinated hydrocarbon pesticides and chlorophenoxy herbicides found were not high enough to exceed the maximum allowable levels recommended by EPA in the Proposed

National Interim Public Drinking Water Standards, except for one sample taken on July 8, 1975, which showed a high level of Lindane (3).

The recommended maximum levels of some of these compounds are shown below:

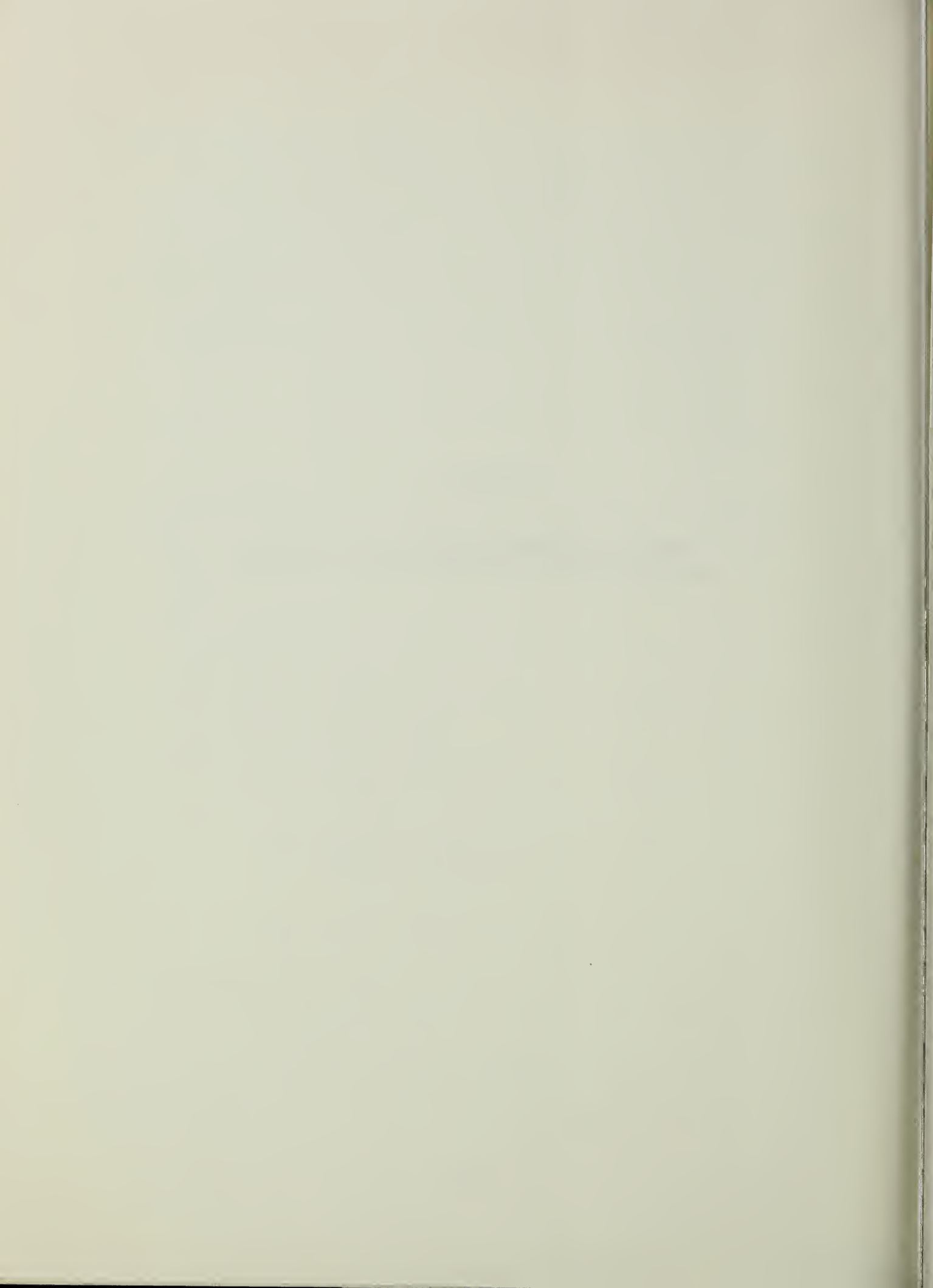
Compound	Recommended Maximum Concentration, ppb
DDT	2
Dieldrin	5
Chlordane	3,000
Endrin	200
Heptachlor	100
Lindane	4,000
2,4-D	100,000
Silvex	10,000

It can be seen from the above data that the water quality in the watershed would be suitable for most uses as measured by these parameters.



APPENDIX E

Impacts of Floodwater Retarding Structures
on Water Quality and Stream Benthic Organisms



APPENDIX E

Impacts of Floodwater Retarding Structures on Water Quality and Stream Benthic Organisms

The SCS contracted with Oklahoma State University to make a water quality study on Robinson Creek Watershed. The O.S.U. study compared Robinson Creek without floodwater retarding structures to Quapaw Creek with structures. Quapaw Creek Watershed is the adjacent watershed to the west and a system of floodwater retarding structures has been in place for several years. Soil types and land use in the two watersheds are very similar and the study determined that data collected from Quapaw Creek could be compared with that collected from Robinson Creek. The study found no statistically significant differences between nitrogen levels, phosphorus levels, or total organic carbon levels, between the two streams. However, the amount of phosphorus which was carried out of the watershed was 34.5 percent less in Quapaw Creek than in Robinson Creek and this difference was attributed to the flood control structures.

The study noted that land use for both watersheds was very similar. However, when only the bottomland areas were considered, Quapaw Creek had a 20 percent greater cultivated acreage than did Robinson Creek. This too was attributed to the flood control structures.

Total dissolved solids, the combined mean chloride concentrations, mean sodium, calcium, magnesium, and potassium concentrations were all statistically significantly higher in Robinson Creek than in Quapaw Creek, although from a water quality viewpoint, the differences appear insignificant.

In Quapaw Creek, the concentration of pesticides exceeded the recommended maximum concentrations in 10 out of 24 samples, while the maximum recommended concentration was exceeded in 14 out of 15 samples on Robinson Creek. However, the concentrations of chlorinated hydrocarbon pesticides and chlorophenoxy herbicides found in both creeks were not high enough to exceed the maximum allowable levels recommended by EPA in the Proposed National Interim Public Drinking Water Standards, except for one sample taken from Robinson Creek on July 8, 1975 (3).

Since 1970, 26 stream gaging stations in Oklahoma have been monitored for pesticides in a cooperative effort by the following state and federal agencies:

1. Oklahoma Department of Wildlife Conservation.
2. Oklahoma Water Resources Board.

3. U. S. Geological Survey, Water Quality Division.
4. Oklahoma Department of Agriculture.
5. Oklahoma Department of Pollution Control.

The results in testing is summarized annually by the Oklahoma Department of Agriculture (13).

One of the 26 stations being monitored is on the Sugar Creek Watershed in south central Oklahoma. Sugar Creek has a watershed protection project similar to the one proposed on Robinson Creek Watershed. The first floodwater retarding structure was completed on Sugar Creek in 1963 and the final structure was completed in 1973. The floodplain on Sugar Creek is primarily in cropland and the intensity of fertilizer and pesticide application has increased significantly since the first floodwater retarding structure was built in 1963. Three to four pesticide monitoring samples a year were taken from 1970 to 1972 and monthly samples were taken from October 1972 through October 1973. Pesticide analyses were made for total DDT, dieldrin, aldrin, gamma BHC, heptachlor, chlordane, toxaphene, endrin, epoxide, methoxychlor, lindane, and arochlor 1260. In February and May 1971 values of 0.80 and 0.96 parts per billion chlordane respectively were detected. The May 1972 samples recovered 0.1 part per billion total DDT while the July 1973 sample showed the presence of 0.63 parts per billion of arochlor 1260. The four pesticides detected represent extremely minute quantities which were not detectable in later tests. No other traces of pesticides were found in almost four years of systematic streamflow analysis for 12 of the common index pesticides.

The OSU benthic organism study mentioned in the Environmental Setting Section of this report, not only studied Robinson Creek as an unimpounded stream, but it also compared Robinson Creek with Quapaw Creek, an impounded stream, just as they did with the chemical water quality study. The study concluded that conditions in Quapaw Creek basin could be used to predict conditions in Robinson Creek basin.

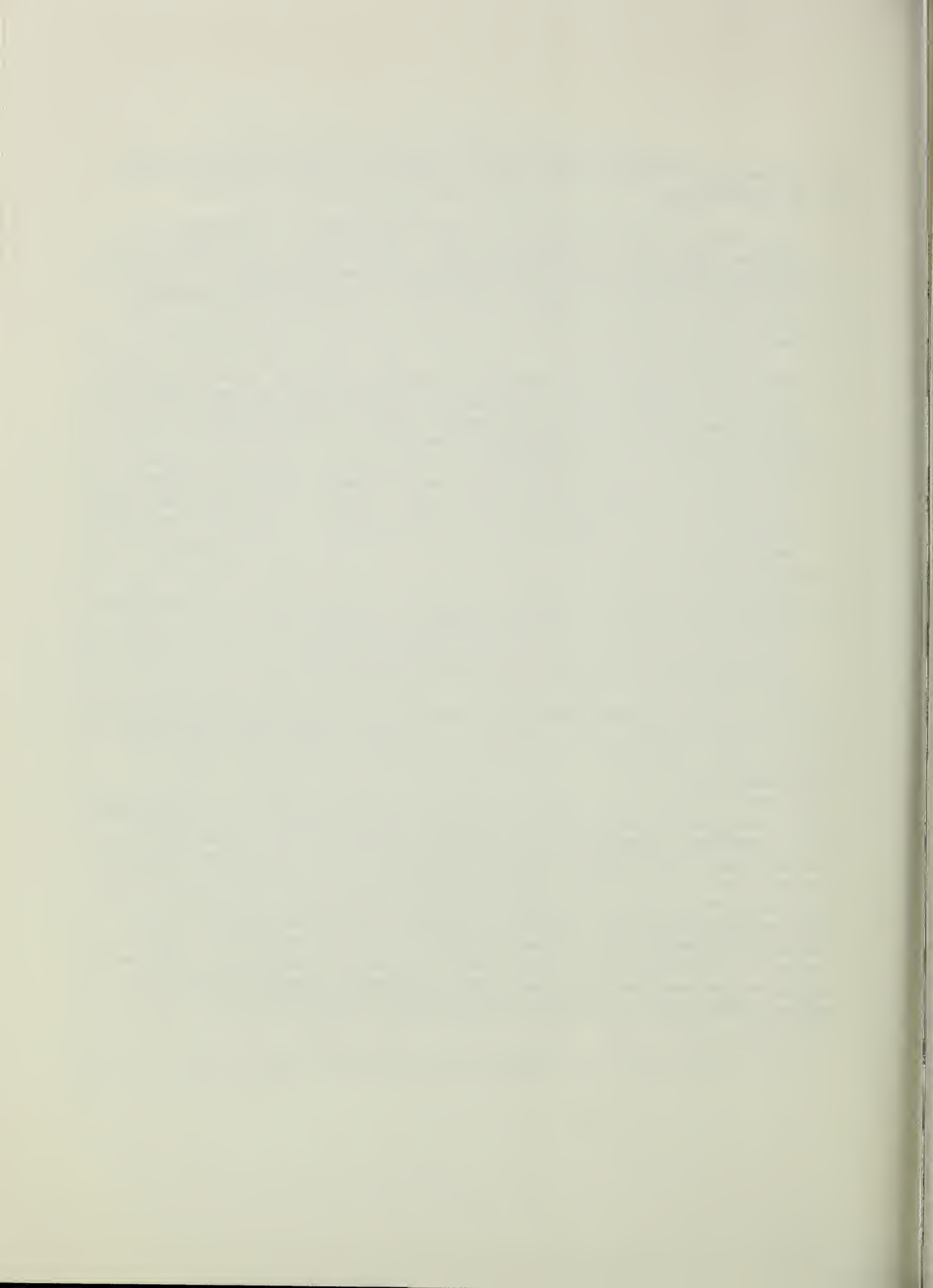
During the study, data from six sampling stations were collected during two seasons, winter and summer. Two samplers each were placed on third, fourth, and fifth order streams in the Robinson Creek Watershed. Stream order is based on stream branching. Unbranched headwater streams are first order. Two first order streams join to form a second order stream, and two second order streams join to form a third order stream, and so on until the stream enters a major body of water. Streams which enter a stream of higher order without passing through this hierarchical system do not increase order.

The following differences were found to occur in stream habitat between the two watersheds:

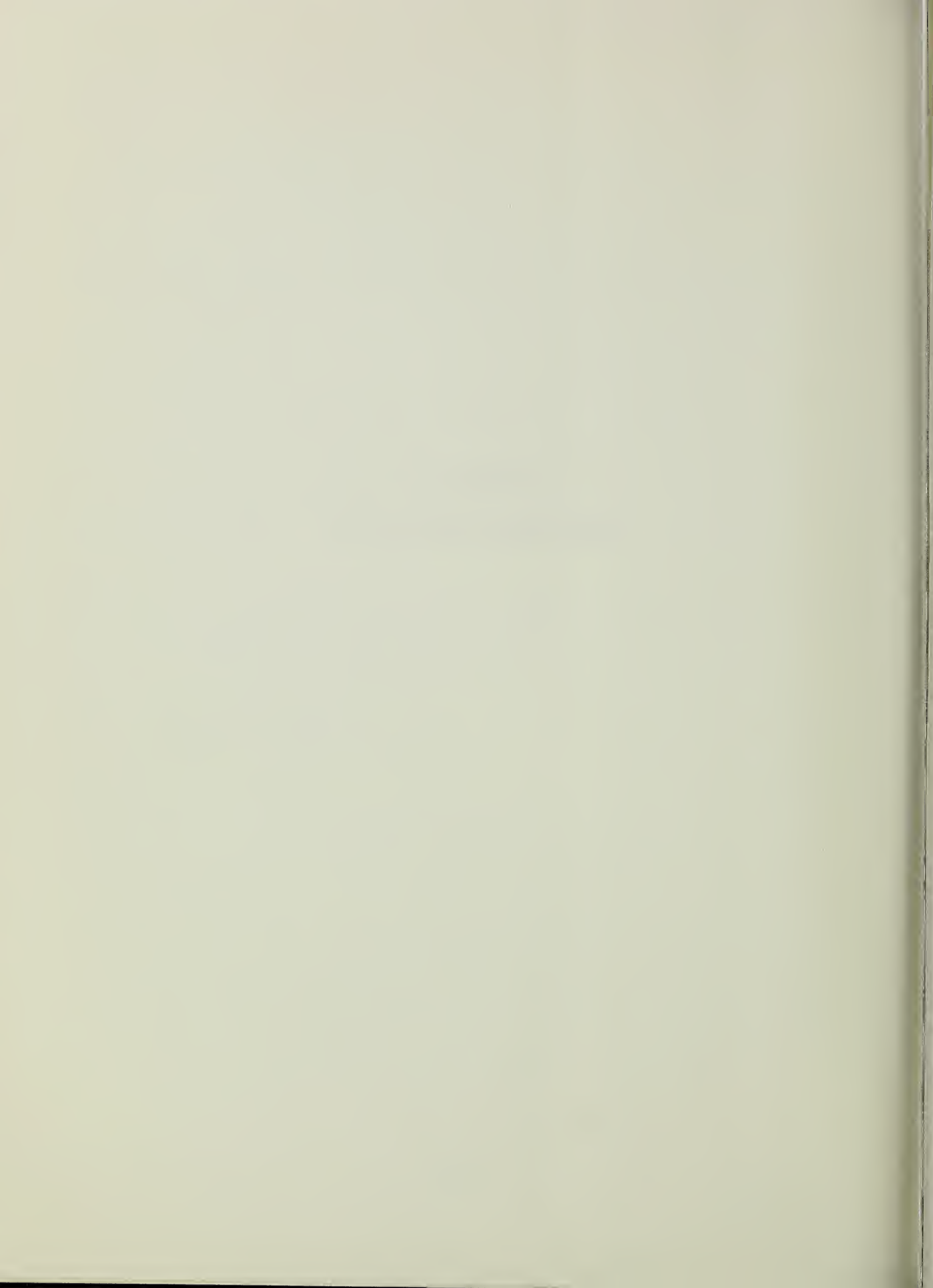
1. On an annual basis, species diversity generally was greater in Quapaw Creek than in Robinson Creek. On clay soils on Quapaw Creek this was true; on sandy soils on Quapaw Creek species diversity decreased. However, species diversity was considerably greater in all stream orders on Quapaw Creek than in Robinson Creek on clay soils.
2. Very significant differences exist between the two streams on clay soils. On Quapaw Creek, diversity increased with stream order at about the same rate in winter as in summer, although summer diversity was generally considerably lower than winter. This was thought to be due to the emergence of insects. However, in Robinson Creek there was a great difference between winter and summer diversity. Winter diversity was about the same in all streams, but summer diversity decreased sharply downstream. This was thought to be due to the action of scouring and sediment deposition by the spring floods.
3. Species diversity increased through the fifth order of Quapaw Creek on clay, and was only slightly reduced from fourth to fifth order on sandy soils; whereas diversity progressively and drastically decreased downstream in the Robinson Creek basin.

The study concluded that even partial upstream impoundment, whether or not it effectively controls downstream flooding, appreciably improves environmental conditions, as measured by species diversity, some distance downstream.

Since the chemical study showed no significant differences in the important parameters between the two streams, the difference in species diversity was attributed to changes in the physical stream environment brought about by the flood control structures. The structures improve the stream environment for bottom dwelling organisms to the extent that they prolong streamflow in smaller stream orders (upstream channels), and reduce flood height and bottom scouring. Fall and winter runoff stored in the impoundments and released through the winter, maintained sufficient streamflow to allow macroinvertebrate colonization of low order streams which normally would have been dry and devoid of animal life (6).



APPENDIX F
Water Quality Research Data



APPENDIX F

Water Quality Research Data

In the proceedings of the workshop on water quality and land use activities held at Guelph, Ontario, in September 1973, Dr. R. F. Holt (as well as most other experts in fertilizer and pesticide transport) concluded that "the bulk of the chemicals transported by water off agricultural land is attached to or is an integral part of the sediment." Those activities which reduce sediment production will also reduce fertilizer and pesticide movement.

In studies on eutrophication, it has been pointed out that enormous growth of plants in streams and lakes does not occur if the nitrate as N is kept below 0.3 ppm and the total nitrogen as N is below 0.6 ppm (12).

Not only must nitrogen and phosphorus be present in sufficient quantities and in the proper chemical forms, they must also be present in the proper proportion. A common nitrogen to phosphorus ratio of approximately 30:1 is required to promote an algal bloom. The ratio for specific algal forms varies from approximately 15:1 up to 50:1. It has also been reported that plankton were 13 times more abundant in clear water and 1.5 times more abundant in moderately turbid waters than in muddy Oklahoma ponds (8).

In order to compare the proposed project with a stream system having historical data on water quality and flood control programs, the Washita River study was used. Water quality data from May, 1944, until the present are available at the Durwood gage near the lower end of the Washita. An extensive system of floodwater retarding structures with resultant changes in land use and pesticide and fertilization usage has occurred since 1944. The first floodwater retarding structures were built on the Washita in 1948. By 1957, 171 floodwater retarding structures (primarily in the upper reach above Clinton, Oklahoma) controlling approximately 7.0 percent of the area above the Durwood gage had been constructed. The period from May 1944 through 1957 essentially represented the pre-project period when there was a limited number of structures. Fertilization was not a common practice prior to 1957. The Bureau of Reclamation's Foss (1961) and Fort Cobb (1959) Reservoirs, together with the presently constructed 983 watershed reservoirs, control 51 percent of the drainage area above the Durwood gage.

An examination of the historical trends of discharge versus nitrate (NO_3) concentrations for the period before and after 1957 discloses

the fact that the trend of nitrate concentration has been downward during the same period that considerable project activity has greatly reduced the overbank flows.

Chemical analysis of ortho-phosphate (PO_4) were not initialed until 1967 so a before and after comparison is not possible. However, measurements were made during 1967 and 1968 water years. The range of concentrates of ortho-phosphate during this time was from 0.01 to 0.10 ppm.

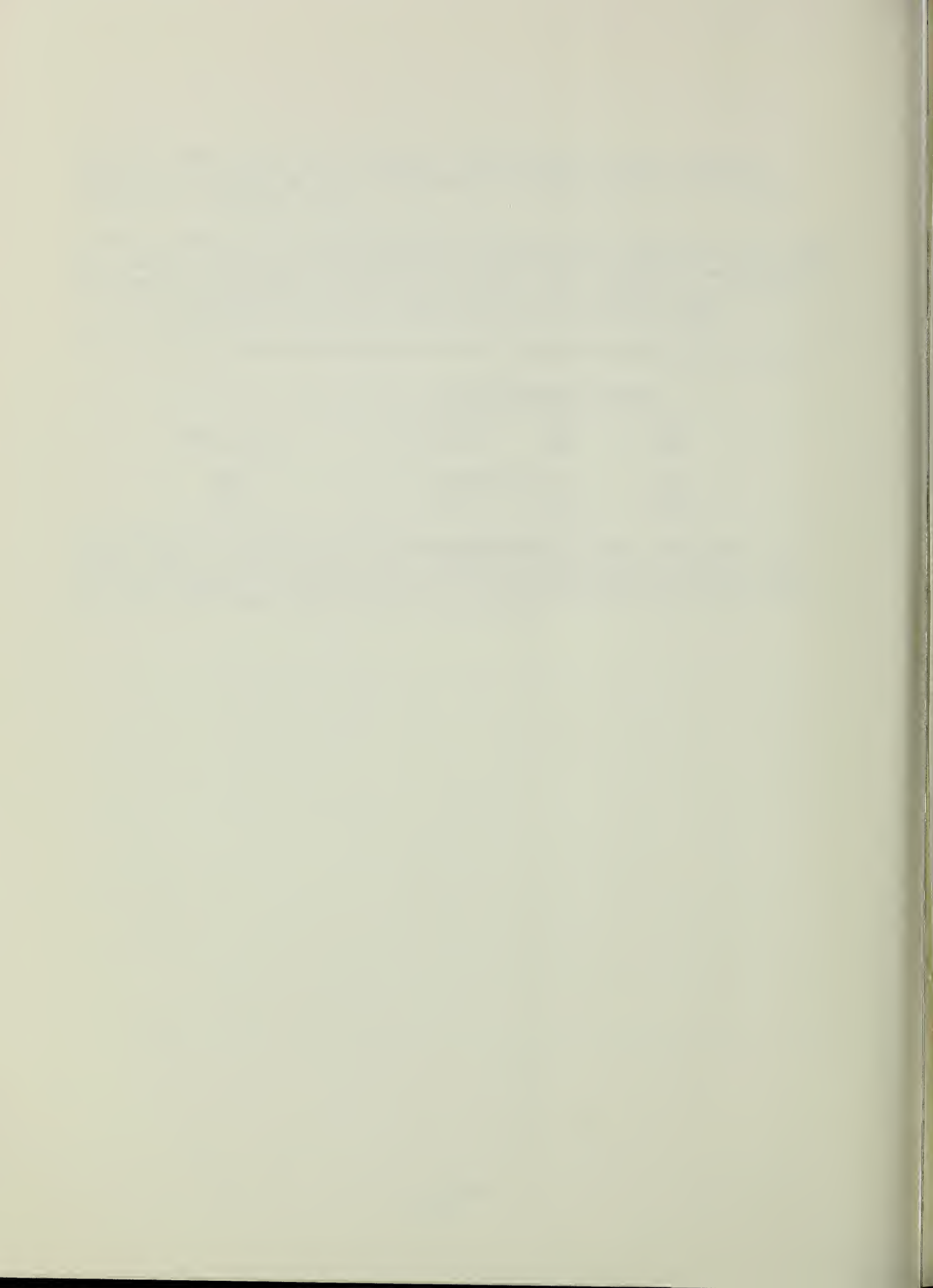
The following ortho-phosphate and nitrate concentrations were measured:

<u>Water Year</u>	<u>Time Weighted Average</u>		
	<u>Discharge</u> <u>(CFS)</u>	<u>NO_3</u> <u>ppm</u>	<u>PO_4</u> <u>ppm</u>
1967	436	3.5	0.54
1968	1160	2.2	0.35

The nitrate and phosphate concentrations measured were sufficient and in proper ratio to have caused algal blooms in clear water; however, significant symptoms of eutrophication in the Washita River or Lake Texoma below have not been noted during this period.

APPENDIX G

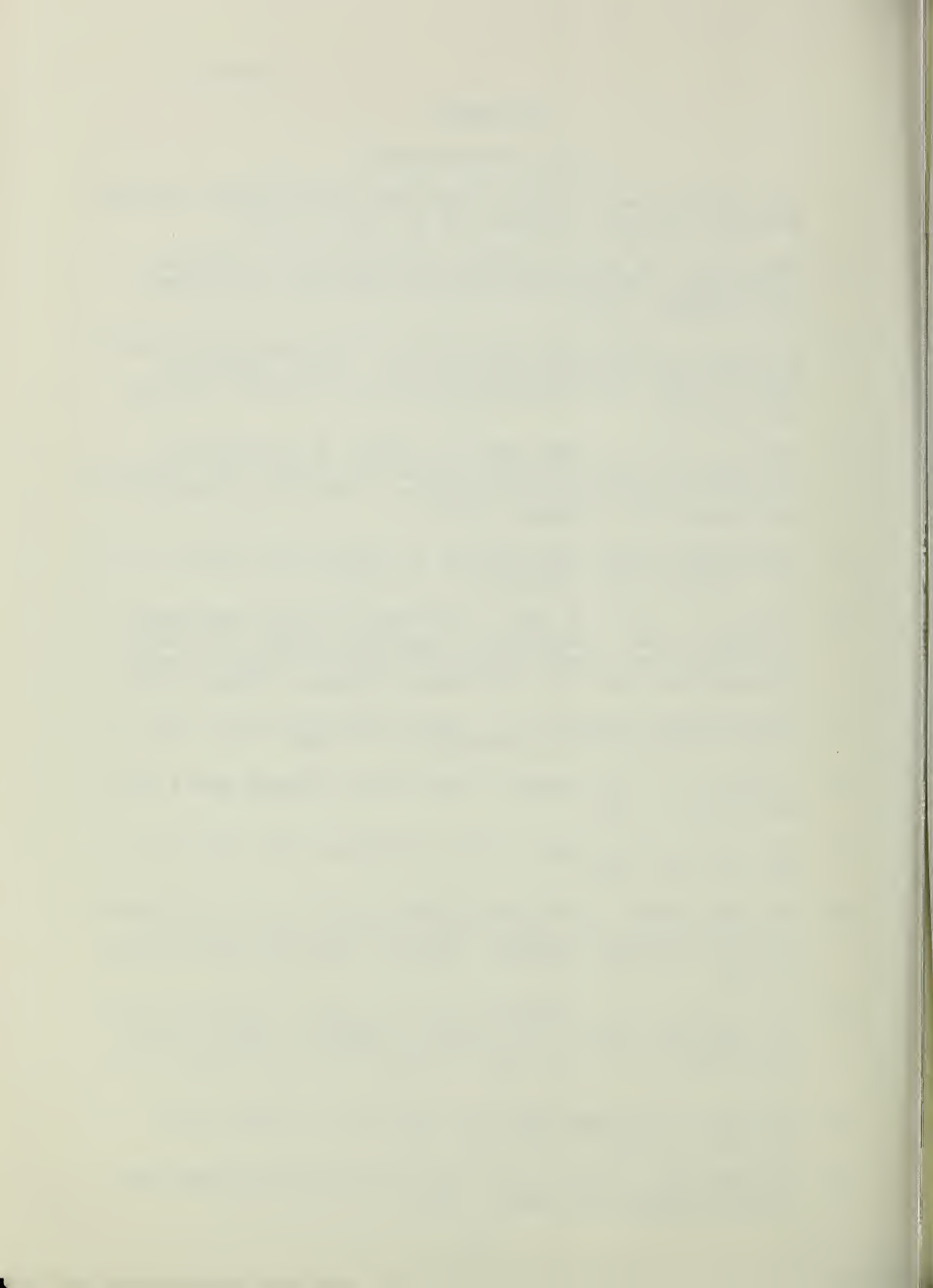
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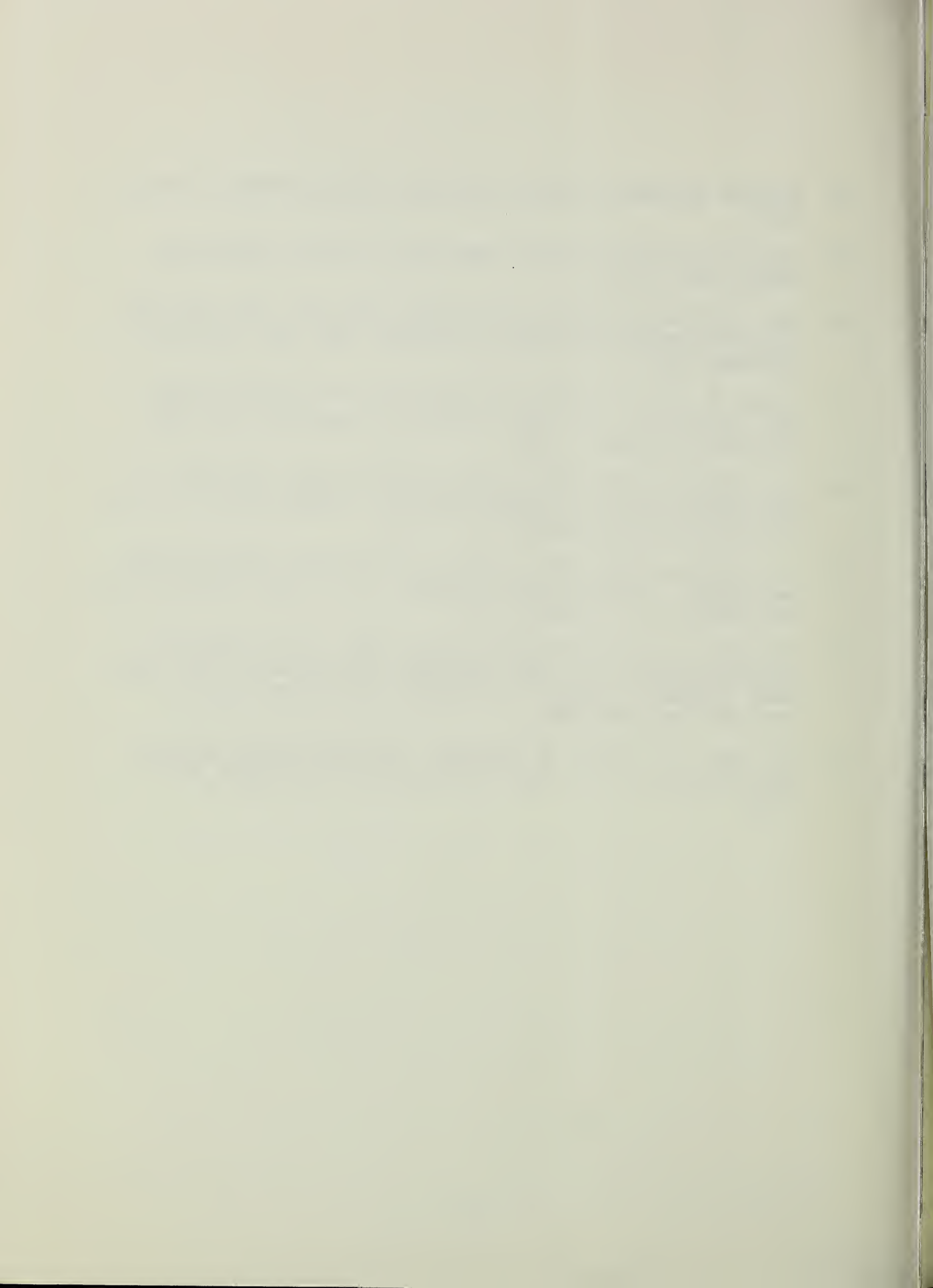
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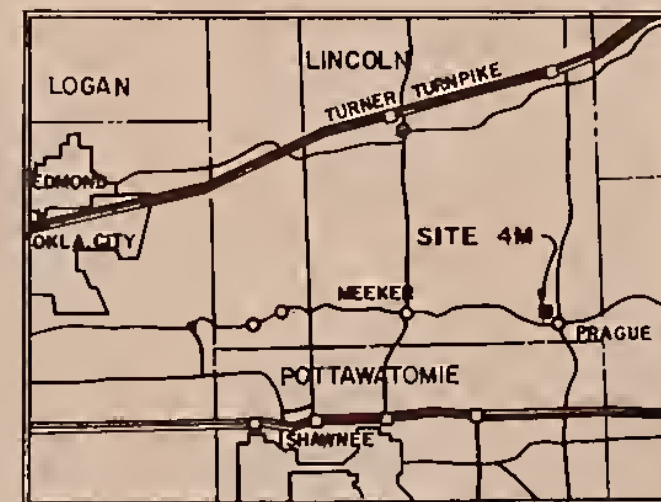
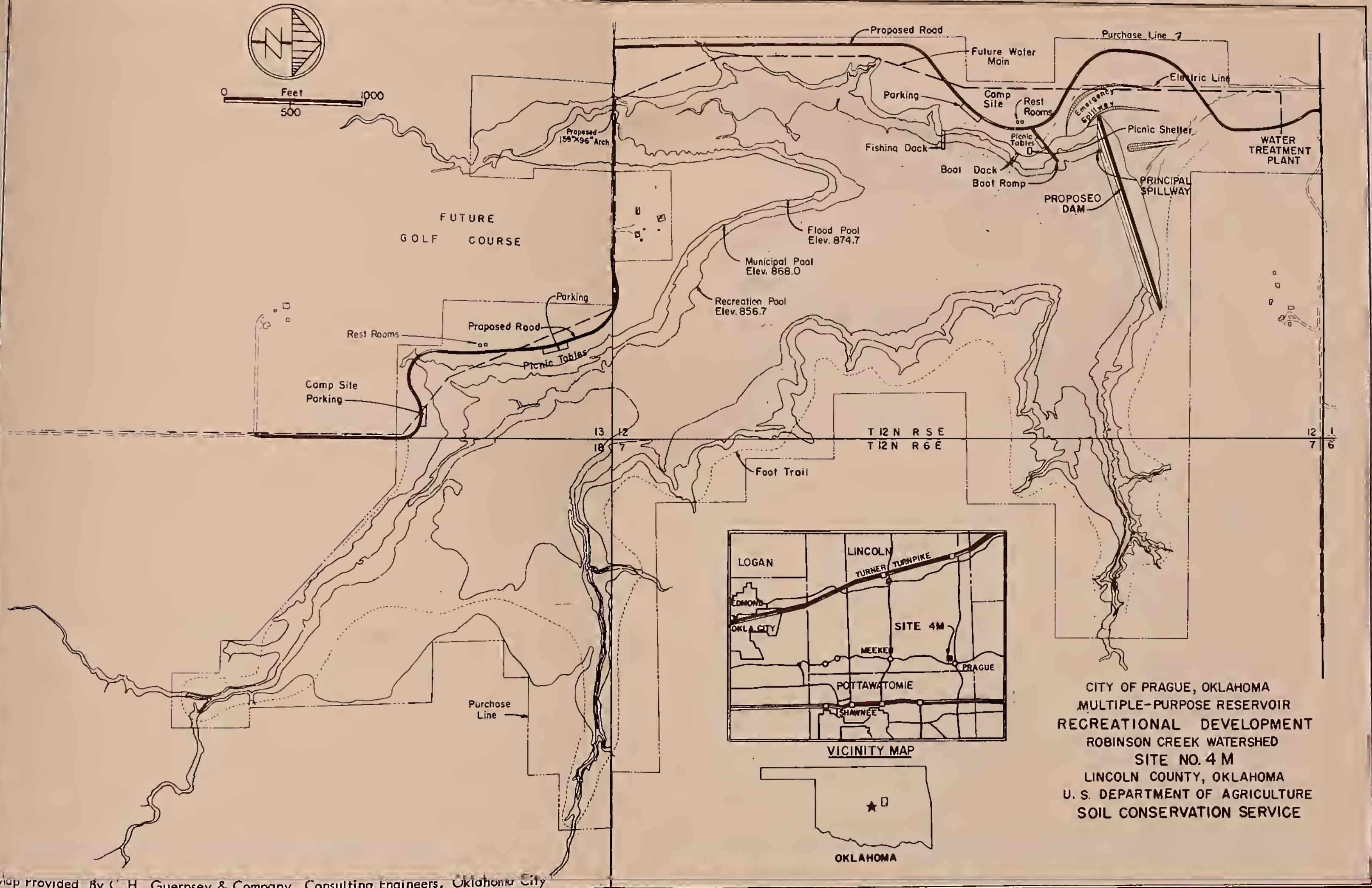
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APPENDIX H

Multipurpose Reservoir Development Map





VICINITY MAP



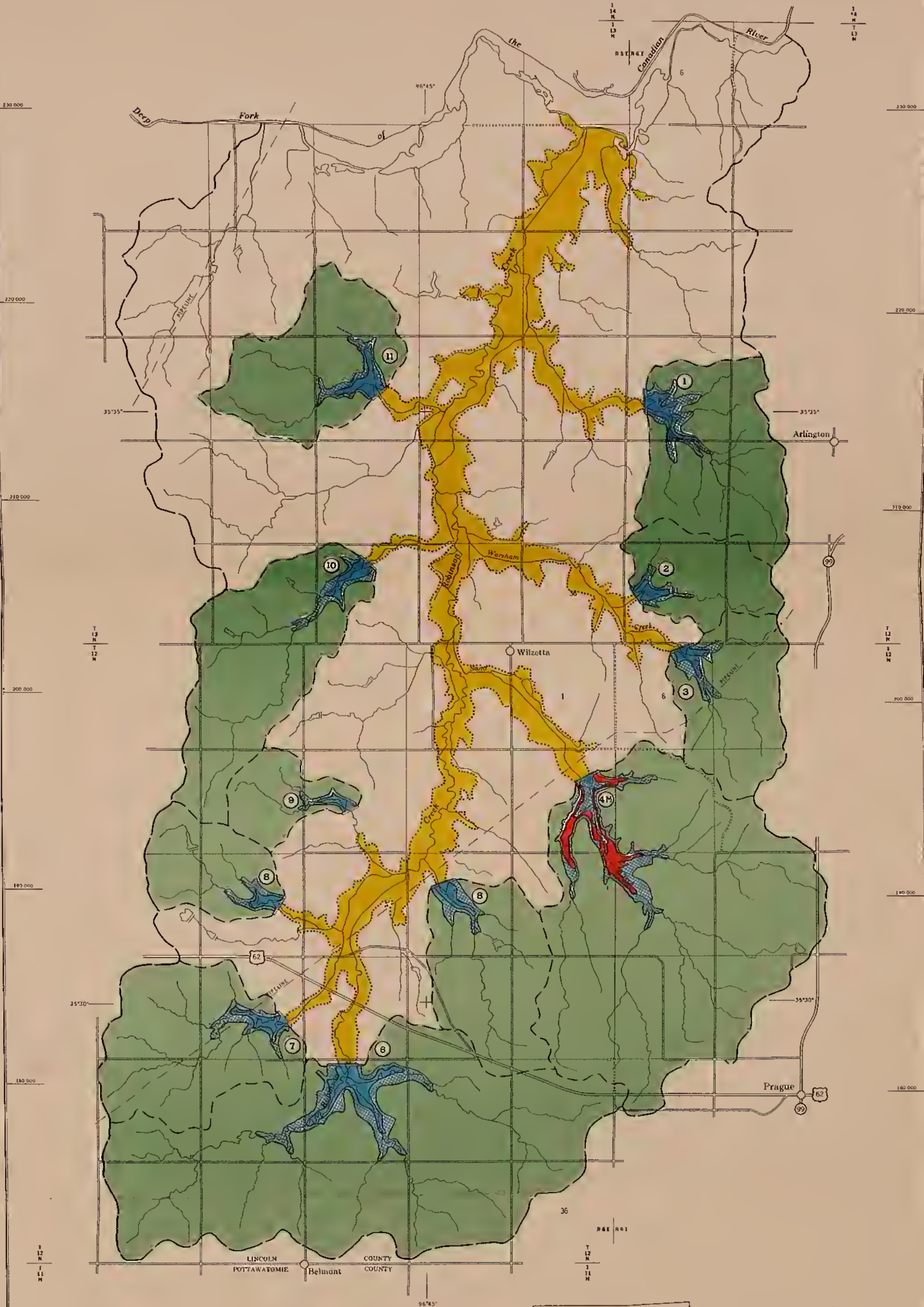
OKLAHOMA

CITY OF PRAGUE, OKLAHOMA
 MULTIPLE-PURPOSE RESERVOIR
 RECREATIONAL DEVELOPMENT
 ROBINSON CREEK WATERSHED
 SITE NO. 4 M
 LINCOLN COUNTY, OKLAHOMA
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE



APPENDIX I

PROJECT MAP



LEGEND

- 62 U. S. HIGHWAY
- 99 STATE HIGHWAY
- PRIMARY ROAD
- SECONDARY ROAD
- TOWN
- COUNTY LINE
- RAILROAD
- DRAINAGE
- WATERSHED BOUNDARY
- BENEFITED AREA
- DRAINAGE AREA CONTROLLED BY STRUCTURE
- FLOODWATER RETARDING STRUCTURE
- 1 SITE NUMBER

SITE NUMBERS AND DRAINAGE AREAS

NUMBER	ACRES
1	1,395
2	698
3	985
4	4,756
5	1,018
6	4,813
7	1,568
8	672
9	467
10	1,677
11	1,216

PROJECT MAP
ROBINSON CREEK WATERSHED
LINCOLN COUNTY, OKLAHOMA



BASE COMPILED FROM USGS QUADS AND OKLAHOMA GENERAL HIGHWAY MAPS. POLYCONIC PROJECTION.
10,000 FOOT GRID TICKS BASED ON THE OKLAHOMA COORDINATE SYSTEM, NORTH ZONE.

SOURCE Data compiled by Watershed Planning Staff

